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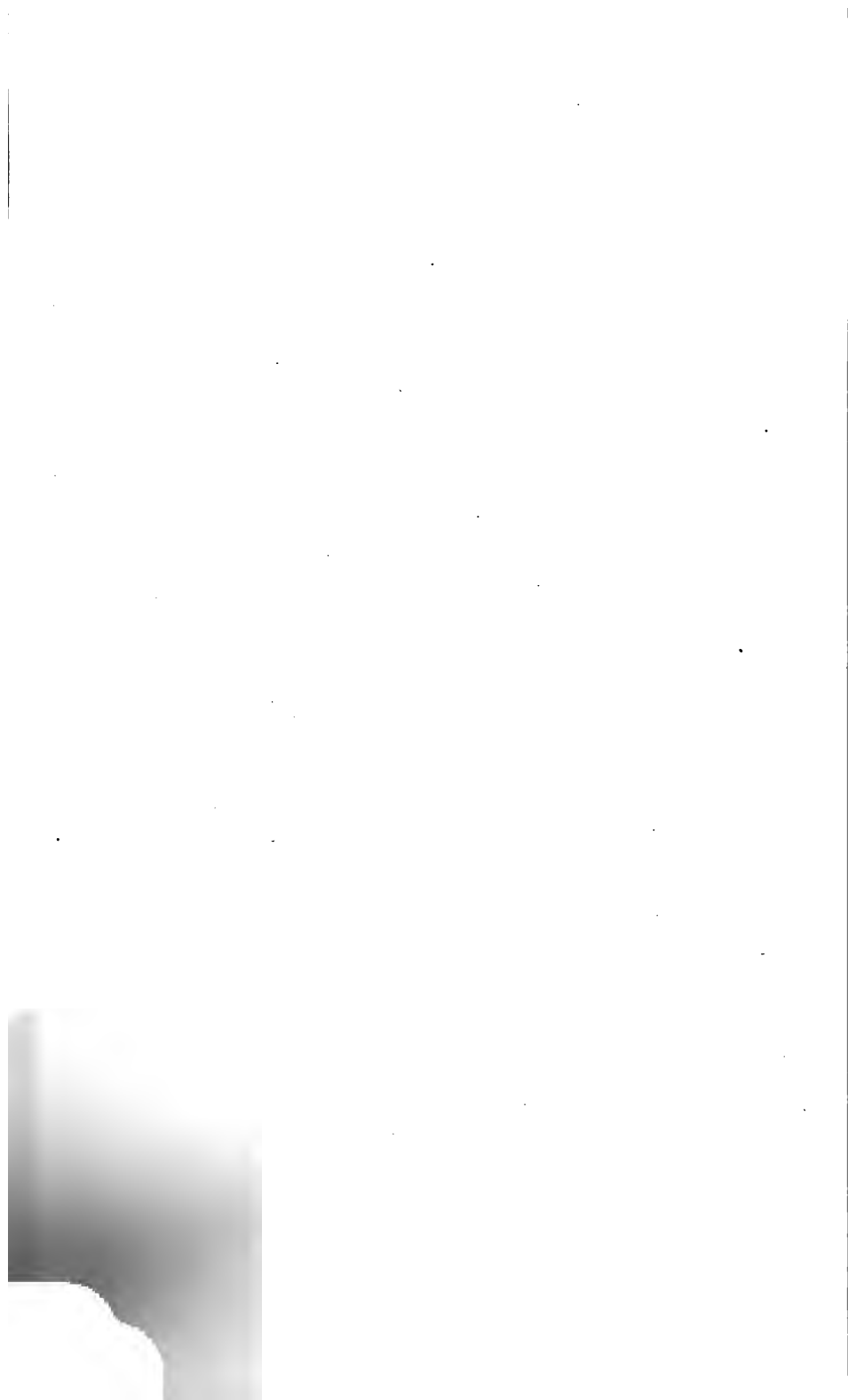
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GUY'S HOSPITAL REPORTS.

EDITED BY

C. HILTON FAGGE, M.D.,

AND

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CASES OF TRANSFUSION,
WITH SOME
REMARKS ON A NEW METHOD OF PERFORMING
THE OPERATION.

By J. BRAXTON HICKS, M.D., F.R.S.

Of the following cases of transfusion the majority occurred in the Maternity Charity of this hospital, and I think that a record of all such cases is desirable, whether they have been attended with favorable results or not; from all, whether by failures or successes, we learn something. Unfortunately it is rather to the former than the latter that we must look for suggestions for improvement, inasmuch as it must be admitted that the successful cases are few compared with those which have the opposite result. And here it may be remarked that it seems at first sight not a little surprising that an operation which has for its object the restoration to the bloodless patient of the very fluid lost should not have been more extensively employed; and yet nearly a century has elapsed since Dr. Harwood first recommended it in cases of extreme hæmorrhage.

It is true that from time to time transfusion of blood has been vigorously revived by individuals, without having been taken up by the general body of the profession; it may not, therefore, be a waste of time to inquire into the probable reasons which have prevented so important an operation from having been generally adopted. It appears to me that the want of general success, and the various impediments which occur during

the performance of the operation, are the principal influences which have prevented its frequent use.

Now, the want of success will be apparent to any one who has looked into the literature of the subject. It will be noted that notwithstanding the accounts of very successful cases (and so far they are very satisfactory) the total number recorded is but small. Indeed we might almost say that each case is isolated; for the writers who have most urgently recommended the operation have each but a solitary case to bring forward as the result of their own experience; while the principal monographs have recorded not so much the result of the operation on the human subject as the possibility of its success, based upon experiments on the lower animals.

Consequently, to many minds this form of argument has doubtless not been so conclusive as that which would be produced by an array of a number of cases more or less successful, so that the operation, although recognised as legitimate, has not called forth that enthusiasm which might have been expected for one which would appear at first sight so peculiarly consonant with the requirements of the case. But to what causes may we attribute the want of success?

In the first place to the postponement of the operation till too late a period.

The difficulty of recognising the exact period at which to operate, and the impossibility of obtaining the apparatus in time in many cases, will always militate, to a considerable degree, against its frequent employment. With regard to the period at which transfusion should be done much consideration is needful and indeed some experience; because if, on the one hand, we place the patient unnecessarily under it, we may inflict on her much trouble and, I may say, risk; while, on the other hand, if we postpone the operation beyond a certain period, we shall find our efforts useless, and the patient will probably die under our hands.

When loss of blood takes place suddenly, as in post-partum hæmorrhage, the whole system receives such a shock that the ordinary processes of assimilation appear to be suspended, or in other words, the sympathetic seems so utterly to have lost sensibility that it is unable to perform its usual duties. So that whether we pour brandy into the stomach or blood into

the veins no visible benefit is produced, but the patient dies without any attempt at rallying whatever; or with only such a slight effort that our disappointment is all the more complete.

When the loss of blood is more protracted, although the total quantity lost is the same, the shock is not so severe, neither is the case so unmanageable nor so hopeless.

Hence it is of much importance to ascertain the symptoms which show to us that the loss of blood has been beyond the tolerance of the patient. But here our difficulty is great, and a certain amount of experience is required to discern them; because if we rely on any one symptom we shall be in much error.

For instance, although the permanent absence of the pulse at the wrist be the most certain evidence of impending death, still I have seen, as doubtless many others have, the pulse absent for an hour, and yet the patient recover quickly. Neither can the amount of blood lost, even if we gain a fair estimate of it, be taken entirely as a guide. For by a loss which one woman would consider trifling, another would be put in jeopardy of her life; and that which would be fatal to a multipara, especially if over forty years of age, and poor or half starved, would produce only a transient effect on a primipara.

Again, if we reckon upon loss of voice or of muscular action as a very serious sign, we shall often be surprised at the very vigorous voice and powerful muscular efforts which continue to the very last, and which no doubt hasten the fatal termination.

Perhaps the symptoms on which I should rely most are the obstinate jactitation and resistance to comply with our wishes in regard to treatment, coupled with the persistent indistinctness of the pulse. When these are well marked from the first I have generally found that all treatment is useless. It will, therefore, be our object to anticipate the full development of such symptoms.

But, unfortunately, we are apt to postpone, till the latest moment, the performance of an operation which is no doubt not without risk to the patient, and which is also a loss to the supplier of blood; and then often it happens that the case is beyond recovery.

Again, there is another circumstance which militates against its value in obstetric hæmorrhage; I mean the uncertainty as

to whether the system will retain the blood after introduction. This applies equally to transfusion done before and to that after delivery: because like as before delivery we have no means (except in some few cases of placenta prævia) of restraining with certainty the bleeding, so in post-partum hæmorrhage the capabilities of enormous loss are so great that we might readily find that, even without much show, the whole of the blood we had been at such pains to introduce might have escaped from the system; particularly as in these cases the uterus is never remarkable for its firm contraction.

But when transfusion is performed before delivery an additional impediment to the recovery of the patient arises from the exhaustion caused by the uterine action and the voluntary efforts accompanying it. This has been well marked in numerous cases of extreme hæmorrhage which have occurred in my practice; the patients continuing to sustain the loss tolerably well till the efforts of the uterus have commenced, when the pulse has begun to flag, and not unfrequently death has taken place before delivery could be accomplished. The same depression may also ensue on the manipulation, which frequently is necessary in cases of placenta prævia and of accidental hæmorrhage.

A practical difficulty in the accomplishment of transfusion in obstetric cases is derived from the generally awkward position of the patient, which is commonly the most inconvenient possible; the state of exhaustion being such as to render any attempts at moving dangerous in the extreme. For instance, in one case I had to perform it round the pole of an old-fashioned half-tester bed; the patient all the time tossing restlessly about.

Another hindrance is the want of appliances among the poor. This is especially felt when the syringe- and funnel-instrument is used. I have done it with one basin and two quarts of water, where the instruments had to be washed up three times owing to a difficulty in obtaining quickly the blood.

Again, where the husband has to be brought into the room, the flow of blood is often very slow; for be one as careful as one can, the whole scene is appalling to a man never used to such a sight, and conscious that his wife is in extreme jeopardy.

Again, one of the most trying hindrances is to be found in the tendency of the blood to coagulate at all stages of the operation and in all parts of the instruments. And besides the

obstruction this causes to the performance the chance of driving a small clot from some portion of the instrument into the venous circulation is very considerable, and its result highly dangerous. This is particularly the case with all complicated instruments; such as the old funnel and syringe, with a gum elastic tube detachable from the beak which enters the veins.

In the four cases in which I have used blood only I have employed this instrument, but I have on each occasion found the greatest inconvenience and detention from the coagulation. Since I first adopted the plan to be mentioned to prevent coagulation, modifications have been introduced having for their object the simplifying of the instrument: among them I may mention the gravitation one of Dr. Hamilton, and the simple syringe of Dr. Graily Hewitt. Both these tend to make the operation more immediate, and thereby lessen the tendency to coagulation, but are not capable of doing so entirely, for should any slight detention occur even in them a coagulum will form. Dr. Aveling has suggested a still more immediate method, *i. e.*, by passing a tube between the two veins, but the difficulty of practically employing it in many obstetric cases will be great unless the tube be lengthened, in which case a tendency to coagulation will be increased; while in some cases any form of immediate transfusion must be practically impossible. At the same time where it can be brought into use it will probably be found the best method.

To prevent the fibrillation of the blood, therefore, would appear to be the most certain way of overcoming the difficulties of the operation, in order that we may perform it calmly and without the necessity of taking the apparatus apart to wash it during the time of use.

For those cases where immediate transfusion cannot be employed, I will venture to bring forward the plan which I have adopted on four occasions: not in a spirit of boasting, nor of urgent recommendation, but rather as a hint, and as an earnest of better things; though I may say so much that, in regard to the ease and comfort with which the operation can be done by it, I have found it beyond comparison superior to the old plan.

It is well known that certain saline solutions are tolerated by the system when injected into the veins. It is also well

known that many have the property of preventing the coagulation of the blood. It struck me if one of those best tolerated by the system, and having also this property, were mixed with the blood, a considerable advantage would be gained. Dr. Pavy¹ kindly advised me on this point, and recommended phosphate of soda as the safest salt to employ. I, therefore, made several experiments on dogs, and found that blood mixed with solution of phosphate of soda, and kept out of the system for some time, could be injected back into the animal without any detriment. For this result I was prepared, because Dr. Pavy had told me that he had found that blood from an animal killed the previous day could be injected into the circulation of a dog without harm.

But with the human subject this, of course, could not be expected, for blood deterioration occurs much more readily than in the lower animals. The experiments, however, showed me that the operation could be conducted much more satisfactorily than before, and made it highly probable that it was not necessary instantly to pass the blood into the patient's vein, but that time for methodical action might be permitted.

How far the plan will compete successfully with that of defibrinating the blood I am not prepared to say. The time occupied in whipping out the fibrine is an element of importance, at least in the more sudden cases. Unless the blood be strained previously to being injected, there must always be danger of small free clots passing through the instrument. The quantity of blood obtainable is frequently so small that the whipping would be somewhat difficult; whilst the addition of the solution adds to the amount of fluid injected. For very often the heart ceases to beat because there is absolutely not sufficient circulating medium to stimulate its action, nor sufficient for it to contract upon. The addition of any kind of fluid is, therefore, an advantage, at least temporarily.

Dr. Routh, in collecting the records of transfusion, noticed that those cases did worst in which a quantity above four ounces of blood was injected, and he hence infers that to inject a larger

¹ Dr. Pavy has pointed out to me the danger of injecting saline solutions without due care and trial on the lower animals. He has found solutions of carbonate, bicarbonate, and nitrate of potash immediately fatal; and although carbonate of soda can be borne, he thinks that it may not be safe ultimately.

quantity adds to the dangers. But it may readily be answered that those cases where only a small quantity was injected had lost less blood previously, and therefore that it did not require so much to cause a response in the pulse. And again, there is no doubt but that, without any attempt to defibrinate the blood, the longer the time taken in the operation, the greater the danger of driving a clot into the circulation; but the larger the quantity of blood injected, the longer the time; and thus the danger from this source would be increased.

The latter objection, however, will not apply to the plan now proposed. Besides, in the cases hereafter recorded the operation was done slowly, two ounces at a time, with good intervals; the pulse being watched all the time, so that no sudden overloading of the right side of the heart could have occurred.

Of the following cases two were done by the old plan, and the remainder by the one above proposed.

OLD PLAN.

CASE 1.—*Post-partum hæmorrhage; transfusion; death.*

M. W—, æt. 31, seventh confinement. Placenta adherent in the last four labours; she nearly lost her life from hæmorrhage in her previous one.

She was delivered naturally on the 14th December, 1861. Immediately after the birth of the child a sudden gush of blood occurred. The placenta was found to be very firmly united nearly everywhere. Stimulants were given freely; when I arrived shortly after, I found her blanched, almost pulseless, only partly sensible, with cold extremities, and with slight jactitation. As free oozing was still going on, I peeled off the placenta, without further loss during or after the operation. For about half an hour she remained in the same state as when I first saw her, but after this the pulse began to fail towards complete extinction. I, therefore, transfused pure blood from her husband. It was done under many difficulties, arising from the position of the patient behind a bed-post, and the faintness of the husband, whereby the supply of blood was lessened. However, about five ounces altogether were injected at three separate times into the median cephalic vein, with the assistance of my clerks, Dr. Cook and Mr. Soper. This produced a slight improvement, for

she was able to talk loudly and to raise herself partly up in bed. She soon, however, relapsed into the former state of depression; the pulse ceased at the wrist, and she died two hours after delivery.

The apparatus employed was the funnel and syringe of Dr. Blundell. The coagulation of blood was the greatest trouble which interfered with the performance of the operation. The instrument had to be washed out three times, owing to coagulation during the check of the supply from faintness of the blood-giver, but I believe no clot was injected into the vein.

CASE 2.—Accidental hæmorrhage; transfusion; version; death.

Mrs. A—, æt. 38, mother of six children. She had been in poor circumstances lately. She was nearly at full term of pregnancy; while at a neighbour's house she was noticed hysterically laughing, and then to be confused in mind for a few minutes. A large gush of blood was found beneath her; she moved about the room making three pools of blood; she was ghastly pale, and was taken home, where another pool of blood was found on the floor. She was placed in bed, and my clerk, Mr. Booth, found her pulseless; the os uteri was the size of a crown piece. She continued pulseless an hour, when there was some slight attempt at reaction, and the pulse could be felt as a fine thread, beating 120 p.m. Two hours after the attack I saw her. There had been but little loss since. The os was the size of a crown piece, but not dilatable; her depression was so great that the examination caused a marked subsidence of the pulse. I ruptured the membranes and gave stimulants freely. The surface was cold, and warmth was applied without result. However, after four or five hours the face regained its colour, and the pulse somewhat improved in volume. There was no hæmorrhage going on externally nor internally, as far as could be ascertained. A dose of secale was given to hasten uterine action. Vomiting followed with increased frequency of pulse, which was now beating at 130—140 p.m. In another hour a marked depression of power of pulse again ensued, with jactitation and attempts to rise, the expression of face was drawn, and the breath cold; once the pulse vanished for some time.

I therefore transfused, taking blood from the husband. Six ounces were injected, the result being very marked. For the pulse, from being almost imperceptible, became quite distinct; the jactitation diminished; the breathing steady and quiet. The difficulty of operating was very great, owing to the almost complete absence of domestic appliances.

A slight increase of blood loss again occurring, I thought it best to complete delivery as soon as it could be effected consistently with the safety of the patient. I found the uterus in moderate action and os fully expanded. I therefore applied the long forceps, but owing to the flabby state of the lower part of the uterus, it was somewhat difficult to pass the lower blade. I therefore removed it, and employed combined internal and external version, by which the child was turned easily in a minute. I then gently drew down the child, the uterus contracting after it. But after the whole ovum had been expelled the uterus ceased to contract. Some slight bleeding ensued; I passed my hand into the uterus, cold water was injected into its cavity, but she was reduced to the last stage. She lingered on some little time, during which I made another attempt to transfuse, but as the supply of blood was very slow, coagulation interfered, and practically only a very small quantity entered the veins. She shortly after died, about ten hours after the first occurrence of the hæmorrhage.

The process of delivery in these cases of extreme exhaustion is very depressing, and adds enormously to the risks of the case.

NEW PLAN.

CASE 3.—*Placenta prævia; refusal of assistance till too late; delivery; transfusion by new plan; death.*

Mrs. C—, Irish, about thirty years old; eight months advanced in her second pregnancy. She had been losing blood for three or four days, by which she had been much reduced, but not blanched. A large gush had recently occurred, and oozing was going on when I visited her in the morning of December 23rd, 1863. The os uteri admitted three fingers; the placenta was completely across it. I then proceeded to turn, and detached the placenta in front; but she soon became unmanageable; I kept my hand in the os some little time, hoping to overcome her

objections, but her frantic state and the opposition of her neighbours to any further action prevented me doing more, and therefore I reluctantly withdrew my hand. Chloroform was offered, but notwithstanding the entreaties of her husband, the influence of the priest, and now of her friends, she would have nothing further done. She continued the whole day till 11 at night, when she yielded upon the refusal of the priest to give absolution unless she employed all human aid. But during the day she had lost so much that I was afraid it was too late; the pulse was so weak that on merely turning her over it became imperceptible. By stimulants the pulse rallied; there was no jactitation, she spoke firmly, took stimulants well, and was perfectly collected in mind.

Having prepared for transfusion if required, I passed my hand again, detached the placenta in front, found the membranes a little above the point I had reached in the morning, and soon brought a leg through the os. I waited; expulsive pains soon arrived, and with a little help the child was born in half an hour. The placenta came away readily and the uterus contracted well at first, but soon relaxed, and hæmorrhage arising I passed my hand within, and removed a slight portion of membrane attached to the uterus. Inertia was, however, complete; by no means could the uterus be brought to its firm state; black blood oozed from it. Aortic pressure did no good. As soon as possible I transfused, but she was so far gone by this time that it seemed almost useless to attempt it; and while we were injecting she died. About four ounces of fluid had been passed.

The plan I adopted in this case was that described in the former part of this paper, with the gravitation tube and funnel of Dr. Hamilton, of Ayr. The blood was mixed with solution of phosphate of soda, which prevented fibrillation. It was found to facilitate the process of transfusion to an extent which can only be fully appreciated by those who have employed the old plan. I was assisted by Messrs. Long and Ray.

CASE 4.—Hæmorrhage from abortion; extreme anæmia; transfusion by new method; recovery for eight days; after this sinking and death.

The patient was about forty-two, and her husband had returned from a long residence abroad and separation from her. She

conceived and aborted after two months; the blood loss being very severe, till she was perfectly blanched. Unfortunately the gravity of the case was not recognised, but the bleeding was permitted to continue, without any attempt being made to control it. It had proceeded to extremities when Mr. Burney, of Croydon, was called in, who seeing the extreme danger asked me to see her at once. The bleeding had just then stopped, but next day incessant vomiting succeeded, adding much to the danger of exhaustion; so that when after two days I again saw her she was reduced to complete anæmia; she was completely insensible, with clenched teeth, so that nothing could be given by mouth. Stimulating enemata had been given without benefit. The urine was colourless and free from albumen. The pulse from 120 to 130 p.m. She had been quite well before the loss of blood took place.

I therefore transfused blood, taken from her son, a strong young man. The blood was mixed with a solution of phosphate of soda, sp. gr. 2·5, temp. 90°. It was delivered into the veins by a modification of Dr. Hamilton's gravitation instrument, in quantities of about two ounces at a time, slowly and at intervals, so that three quarters of an hour were taken up in the performance of the operation. This was needful, for the heart fluttered and intermitted if any haste was attempted. The state of anæmia may be judged of by the fact that there was no blood in the vein which I opened; it could only be distinguished by its form and direction.

After eight ounces of the mixed fluid had been thus introduced, a slight change took place, shown by a little restlessness. The pulse next day was reduced to 100 from 120 p.m., and slight consciousness was apparent. From this state she gradually emerged into complete consciousness, taking stimulants by mouth.

On the fourth day she could converse with her friends. She went on in this satisfactory state till about the seventh day, when she gradually became lower, and she sank at the end of the eighth day. I had no opportunity of repeating the operation, which I think might have possibly again restored her.

No more blood was drawn than used; the solution entirely prevented coagulation, and rendered, as before mentioned, the operation simple and easy, and its performance calm.

CASE 5.—Hæmorrhage in placenta prævia; version; extreme exhaustion; transfusion; death.

This was one of hæmorrhage in placenta prævia, after version had been very gently performed by combined external and internal method; the pulse continued much the same as before labour, though of course very weak and quick from the very great loss she had sustained; but about half an hour after it began to sink, and was shortly very indistinct. Other symptoms of exhaustion also appeared. After waiting in vain for some little time to see if any attempt at rallying took place, I determined on transfusion.

The blood was given by her husband. It was mixed with one fourth the quantity of solution of phosphate of soda, which entirely prevented coagulation; and thus the operation was performed with ease, and economy of blood. The rapidity of the pulse fell from 150 to 120 p.m., and its beats were well perceived. The breathing was slower, a marked alteration in this respect taking place during the injection. She continued thus slightly improved for an hour and a half. But when labour pains came on, the pulse became imperceptible, upon which I again proceeded to transfuse, but was able to inject only two ounces of pure blood, and that without effect, she dying in a few minutes after. I was kindly assisted by Mr. Paddon, the Obstetric Resident at the time.

CASE 6.—Post-partum hæmorrhage; transfusion; death.

In this case the patient was in a nearly pulseless state when I saw her. The hæmorrhage had been post-partum; but had stopped when I arrived, and the uterus was contracted. She was excessively prostrate, and had jactitation and senseless twisting about. After trying the effects of stimulants without benefit I transfused. At first, having no phosphate of soda, I injected blood alone, in small quantities at twice. After this I obtained the phosphate of soda, and added it to the blood, altogether about eight ounces of blood with four of the solution. The ease with which the operation was conducted with the solution was in marked contrast to it without the addition. The result on the patient was that at first during the operation the volume

of the pulse increased, and she appeared to improve ; but that after a little time it began to subside, and she sank about three hours after the commencement of the operation, which extended over three quarters of an hour. I am indebted for the report of this case to Mr. Joshua Duke, who, with Mr. Paddon, assisted me.

Besides these cases, I have attempted transfusion in another instance, but the patient died as the blood was about to be introduced.

In all these cases, as far as the performance of the operation itself was concerned, the difficulties were remarkably reduced. The person from whom the blood is taken can be kept in another room, and thus the chances of a free supply are much increased. And if not so, then the addition of the solution in greater proportion will assist in making bulk for a circulating medium. The instrument need not necessarily be washed up between each interval of its use. The syringe form can be employed without risk of driving a clot to the heart.

Thus far, I think, there can be no doubt that this prevention of fibrillation is a great advantage. The only point to be considered on the other side is, whether by the addition of the salt the natural tendency of the blood would be prevented in the uterine sinuses, and thus the blood flow more readily from the uterus.

I am not in a position to answer this question, except that I have not seen anything at present to lead me to believe that this effect is produced. The quantity of solution is small, compared with the total volume of the blood, even reduced by hæmorrhage ; and in those cases where the bleeding has been already stanchèd there can be no such effect, the clots already formed being unaffected by it.

At any rate the certainty of avoiding sending clots into the veins is, as the matter stands at present, a fair set off against the possible drainage from the uterus in a certain number of cases. Besides, in the cases where arrest has not occurred it is questionable whether any good can be expected from transfusion, although we may consider ourselves bound to try it. It remains only to describe the best form for the solution of the

phosphate of soda. It is well to make it as near the sp. gr. of blood as possible. One cannot make a concentrated solution to mix with water when required, because a solution of the sp. gr. necessary is so concentrated that after standing it crystallises out in part. Through the assistance of my colleague, Dr. Stevenson, I would propose that three ounces of the fresh phosphate be dissolved in a pint of water; some of this will crystallise out, but when required for use it will rapidly re-dissolve, if immersed in warm water, at 100° Fahr.

The quantity of this solution required for one operation would be about six to eight ounces. The proportion of the solution to the blood employed should be about one fourth. When required it should be added to the proper quantity of boiling water, and when of the temperature of blood should be placed in the receiving vessel (whatever form we adopt), and gently stirred during the flow of blood; but bubbles should be avoided.

The instrument I have employed has been the gravitation one of Dr. Hamilton, with a ball in the centre to assist the flow when compressed. It answers very well, but the difficulty of expelling air is rather great. However, by the process recommended in this paper the objections to the old instrument are done away with, so that we may use it if it be at hand.

SOME REMARKS
ON THE
NATURE AND CAUSES OF DISEASE.

By SAMUEL WILKS, M.D.

THE well-known division of the causes of disease into the predisposing and exciting, on which every medical author is bound to insist, exemplifies the deep conviction which has at all times been experienced as to the two different methods by which human maladies are induced, even if it does not imply a belief in the actual twofold nature of disease—the extrinsic and intrinsic, or that arising from without and that from within. The expressions “exciting” and “predisposing” have been adopted without any precise definition, although when used in any individual case their meaning is apparent; as, for example, when it is said that typhus fever is excited by contagion in a person predisposed for its reception by bodily or mental fatigue; or that chorea is excited by fright in a child predisposed on account of its nervous temperament. In these cases the term cause is used very differently; in the one we mean by it the disease itself implanted like a seed in a soil temporarily prepared for its growth; in the other we simply refer to an influence developing the innate tendencies of the child to a particular morbid action. We shall find that under the name of disease are included all conditions which cause the body to depart from the standard of health, and thus such diseases as smallpox and consumption have nothing in common but a name. As regards the former, it is clear that we are dealing with a deranged condition of body

due entirely to an external agency, and as regards the latter it is believed that the cause is altogether within. The class of cases of which the first is an example is a comparatively simple one for our consideration, but the class of which the second is the type is one in which the subject of exciting and predisposing causes requires all our attention; for in a large number of morbid states to which our bodily organs are liable the two causes are in operation, but in what proportion in each particular case which comes before our notice may be a question. It is one, however, which requires our practical experience to enable us to answer. In different maladies and in the special examples of them which we have to treat, there is no more important subject for our study than the attempt to discover what external agencies are in operation, and what inherent tendencies to disease are ever present to be developed by them.

That the subject is one of the deepest importance and interest is clear from the amount of work which has been done by our profession in all matters relating to sanitary inquiries, although one must also admit that the manner in which the term causes of disease is used is an evidence of the ignorance which still prevails. For example, we have heard lately of the prevalence of "fevers" in Guildford, and their connection with an imperfect drainage. In popular language this may be well enough, but when coming from the lips of a medical man we should expect something more precise than so vague a statement; he tells you that he implies by it that an epidemic of typhoid, occurring last year, was produced directly by the foul water; that the latter contained the poison or typhoid essence which immediately set up the disease. As regards the later epidemic of scarlatina during the present year, he informs you that he does not mean that the poison was conveyed by the water (although of this he is uncertain), but by human contagion; and that the drainage merely aggravated its character, but whether by actually rendering the poison more virulent, or simply by making the residents of the town more susceptible, he is ignorant. Here it will be seen that the impure water may be thought to act in three different methods in inducing disease, but as regards any actual knowledge of the subject all that can be said is that a connection has been shown between bad drainage and typhoid fever; for, as far as I am aware, no positive facts have yet been elicited to prove

that impure water and its exhalations are associated with scarlatina and other forms of specific disease. For example, I do not know that scarlatina or diphtheria is more rife in the lowest parts of London (using the term in all its acceptations) than in the well-drained suburbs covered with the larger houses of the more respectable community. Then take the case of epidemic cholera, and we hear the same medical man almost at the same moment declare his belief in the specific nature of the disease set up by some element contained in the water, and then act, as regards his restrictions of diet, as if an indulgence in fruit or fish would be equal to its production. He will be constantly shifting his ground as to the causes of the disease, until it is clear that his opinion is not fixed; as probably at the present time it should not be. In these so-called specific diseases which are clearly due to some foreign or external agency, it is highly important to discover whether there be any local causes in operation which tend to their greater virulence in one district rather than another, but at the present time this has by no means been shown.

The term predisposition to disease applies rather to those inherent tendencies to changes in the tissues of the body which develop themselves when any external causes may set them in action. Of late years the subject has been rather in abeyance; but with the ancients the most important branch of medical study was that of predisposition, included by them in the doctrine of temperaments. The reason of the modern neglect of the subject, I think, is obvious. The closer observation of disease by means of physical examination, and more especially the direction given of late to the exclusive study of a small portion of the body, have tended much to narrow our minds to a localised pathology. Thus, auscultation, by increasing our facilities for discovering the actual changes in the heart and lungs, has probably diverted attention from the more general causes which induce their diseases. It might be surmised that the greater devotion paid to morbid anatomy, and the discovery of all those changes in the tissues which the world was ignorant of but a few years ago, had tended to this localisation of disease, but I am convinced that this has had no share in the result. For, as I have had occasion before to remark, no greater mistake can be committed than to suppose that a study of morbid anatomy

restricts us in our views or prevents us from taking a true conception of pathological science ; I believe indeed that the opposite is its tendency. A disease, for example, which has been regarded as local, and is always looked upon in this light by the medical attendant if he has never carried his investigations beyond the lifetime of his patient, is soon discovered, should he once make a post-mortem examination, to be by no means the sole change which has occurred in the body. Should he pursue his observations still further, he will find that it is probably one only of a series of changes with which he will be constantly meeting ; and he will be constrained to admit that his original opinion of the nature of the disease was a very narrow and erroneous one. As a matter of fact, on looking around upon the writings and practice of the eminent men of past days, it must be conceded that those who have devoted a good portion of their time to the study of pathology have been the men who have taken the most comprehensive and, at the same time, soundest views of the nature and treatment of disease. The tendency to localise disease or to direct medicine into special departments has had its foundation rather in mercantile than in scientific principles. The public, approving of the division of labour in commercial pursuits, have chosen to ticket many a good man in the profession with an appellation derived from some organ of the body. These remarks are not irrelevant in considering the reason why local diseases have afforded the principal material for study and for the monographs published by some of our most distinguished men, and consequently for the neglect which has been comparatively shown to the study of disease in general.

Those who have been less restricted in their objects, and those who are engaged in general practice, are more inclined to consider the various circumstances which have favoured the development of disease. They would mark all the peculiarities of the patient, become conversant with his family history, and note the particular temperament to which he belonged. All this is at present done by the discerning medical man, but I am not in error, I think, in saying that it is not taught systematically to the student. Whilst he is instructed in the most precise methods of recognising morbid states of the viscera, he is left uninformed of the causes which may have induced them, for the reason that these are more hidden or obscure ; the former can

be accurately defined, whilst the latter he must pick up by experience; he is taught, in fact, to recognise a disease, but not informed of those circumstances which tend to bring it about, and which, if only recognised, might lead to its arrest. As far as my own knowledge reaches, Professor Laycock, of Edinburgh, is the only teacher who has systematically brought before his class the importance of studying all the varieties of social man, and the tendencies which each has to a particular pathological change, and thus revived an interest in the subject of temperaments which in modern times had almost fallen into desuetude. In London, Sir W. Jenner has done good work in enforcing the distinctions between the different constitutions of children; and I observe that Dr. Sutton, of the London Hospital, always includes a good description of the temperament of the patient in his reports. Dr. Corfe has drawn attention rather to the physiognomical aspect of disease than to the natural constitution of the patient.

As regards the Edinburgh professor, I might state that although my own views have been always in the same direction as his with respect to the importance of a recognition of the various constitutions or dispositions of mankind, yet that I am much indebted to his writings for a distinct and accurate information on the subject. I have been for many years in the habit of enforcing on my class the utility of a recognition of the configuration of the patient, pointing out more especially the features of the scrofulous, tuberculous, and gouty diatheses. Finding that this teaching is by some virtually ignored in the maintenance of such an opinion as that consumption is an accidental affection, I may have been influenced more especially by this circumstance to reiterate at the present time some of my convictions as to the inheritance of disease. At all events, it is sufficient to show the necessity for the study of the subject, for it does appear most remarkable that whilst many of us have been speaking in the most positive terms of the inherited causes of consumption, there have been those who have had no hesitation in looking upon it as a disease, like smallpox, accidentally introduced from without.

Before further speaking of this subject, I shall take a brief survey of those ailments which we all admit to arise from an external cause, and to be due to some specific agency.

By the term disease there is implied merely, it must be remembered, an abnormal state of some bodily function, and thus there may be included in it various conditions having nothing in common; as different as would be the destruction of a nation by civil war amongst various branches of society, and that by the irruption of a foreign force on a united people.

ON SPECIFIC DISEASES.

Some of the diseases which are styled specific have also received the name enthetic, as implying that there has been implanted some new material in the system, and have been called zymotic, on the theory that this morbid material acts like a ferment in the body, working during a certain period, and propagating itself a thousandfold. After its introduction certain definite phenomena appear, and such a change takes place in the system that, for ever after, it is proof against the same poison. Thus, then, arose the idea that there might be something in the blood allied to a fermentable substance, and which might be acted on by an external force until the whole was consumed, leaving, of course, the circulating fluid no longer capable of undergoing the same process. The term zymotic is not, however, intended to convey more than a theoretical idea, and is now made to include several epidemic forms of disease in which the theory would not be attempted to be applied. The term poison, which is commonly used for the active principle of the disease, is an appropriate one, seeing that after its introduction into the system, certain definite and peculiar effects are produced on particular organs or parts of the body, just as would be the case after the swallowing a deleterious mineral or vegetable substance.

The specific nature of any one of the diseases to which I allude is seen in the fact of its having a peculiar source, of there being a definite time in which the poison remains brewing in the system, of the certain period of the constitutional disturbance, of the special phenomena which appear, as well as of the definiteness of their decline. A correct knowledge of these particulars enables us to mark a disease as one *sui generis*. This well-known and apparently self-evident proposition has

not been sufficiently considered, or it would have been unnecessary for me to pen these remarks. It has not always been remembered that a specific disease can have but one cause, and thus cannot be produced by any other than that one, any more than a certain species of animal can be produced by one of another species; if it could, the distinction would cease. If, for example, scarlatina could produce measles, and *vice versâ*, they would be merely varieties of the same disease. If typhoid could be found to generate typhus, or *vice versâ*, they would also constitute but one malady. Again, in describing two animals, there may probably be no one feature which is characteristic of each, but yet the whole group of appearances is very different in the one and the other. It is remarkable how this has been overlooked in the comparison of two specific diseases, and that they have been considered identical because one class of phenomena was common to both; as the state of the skin, or that of the intestinal canal and the lungs. A congested state of these latter organs is not sufficient to show that typhoid fever is identical with another disease; a peculiar eruption on the skin of the ox that the cattle plague is smallpox; nor an observation of the rash alone that typhus and typhoid are one. Cerebro-spinal meningitis and Irish fever cannot be regarded as typhus unless they can be shown to be derived from it and to have the same natural history; at present this has not been done. It has always struck me as very remarkable that those physicians who have maintained the identity of typhus and typhoid have made observations on one or two phenomena only, and have left unnoticed others equally important. The statement of those who deny their identity is, that one has never been known to produce the other, and that the characters of the disease are different throughout their whole course. That they commence differently, that the incubation is different, that the times of appearance, duration, and subsidence of the rash are different; that the duration of the whole disease is markedly different, and that the anatomical changes are totally unlike. It is beside the mark to show what they have in common, for this would only tend to prove that specific diseases are identical.

The first point worthy of consideration is the source of each specific animal poison. As regards the ordinary zymotic diseases which we are now considering, it is believed that con-

tagion or infection is necessary for their production ; that there must be introduced into the system some material substance derived from another person afflicted with the complaint, and thus that it would be possible to stamp out all specific diseases, if those affected could be effectually isolated. There are good reasons for believing in the theoretical correctness of this view. Then the method in which the poisonous material is introduced varies in different cases ; in very many some emanation from the body seems to contain the deleterious quality, whilst in others, such as those of typhoid fever and cholera, it is thought that some excretion from the intestinal canal must be conveyed into the body of the second victim. When it is said that impure water produces these diseases, it means that the germs of typhoid or cholera are contained in the fluid and drunk by the sufferer. The poisons of some diseases, such as variola, syphilis, are best conveyed by actual contact of the patients. An opinion every now and then crops up that the poisons producing these specific diseases consist of low organic forms, mostly of a vegetable kind, and which rapidly grow in the blood to the causation of the symptoms. The opinion is now again much in vogue, owing to the advance in microscopy. The notion that such diseases can arise *sui generis*, at the same time that they are evidently produced by contagion, has not appeared to many to be remarkable ; and thus it has been thought that cholera and typhus fever might arise in any spot, the one from impure food or water, and the other from the massing together of a number of people in a confined locality. This opinion, however, about cholera has almost disappeared, but holds ground as regards typhus fever, and there are some who maintain that syphilis, if stamped out, would be reproduced by promiscuous intercourse. I know, however, of no arguments to prove it, since all evidence tends to show that these specific diseases can only be set up in individuals by the introduction into their system of a peculiar material or poison derived from another person suffering from the same disease. I might say, however, that there is nothing contradictory in the idea of a person being affected by a poisonous fluid which has been spontaneously generated in the body of another, as witness pyæmia, erysipelas, and puerperal fever.

In looking at these specific diseases it is quite necessary not only to observe the source of the infection, but subsequently

the whole character and progress of the case; we shall then discover those features which are common to all, and those which are peculiar.

When a poison, as the hypothetical typhine or varioline, is introduced into the system, it probably commences immediately to effect some change in the blood, although during this period there is no manifestation of its presence. This is the hatching time or stage of incubation. It is highly probable that the time which is required for this process is fixed for the different diseases, but at present no accurate information exists for many of them, seeing that it is very difficult to mark the date of exposure to contagion. The period of incubation appears to vary in different specific diseases from one to a few days.

At the end of this period the whole system becomes suddenly and violently disturbed after the manner known as the onset of fever; there may be a shivering, accompanied by pains in various parts of the body, followed by the other symptoms of pyrexia, such as increased temperature, rapid action of the heart, furred tongue, headache, want of appetite, highly-coloured turbid urine. Whether these symptoms are due immediately to tissue changes is not ascertained with scientific accuracy, but in all probability the two facts are intimately connected. The blood is evidently changed, and thus every organ in the body suffers; congestions, extravasations, and ecchymoses being universally found in all these specific diseases, and, at the same time, there is necessarily an absolute prostration of all muscular and nervous power. These symptoms are common to all the specific diseases at this period, varying rather in degree than in kind; thus, in one the headache may be more intense, and in another the sickness more urgent.

After these febrile symptoms have existed for a definite period, varying in each case so that the particular form of disease may often be thus recognised, certain changes take place in the mucous membranes within the body and on the cutaneous surface without. These changes are peculiar, and afford the chief or most marked phenomena by which we are able to distinguish one disease from another, when we are ignorant of the whole history of the case; it frequently happens that the rash on the skin constitutes the principal means by which we recognise and name the form of complaint. It is possible, however, for

the disease to exist without the cutaneous eruption ; as we know may occur in typhoid fever, in scarlatina, and, according to Sydenham, in smallpox. If this be so, it is more than probable that some other specific or zymotic diseases exist than those having at present a place in our nosology, but, possessing no characteristic cutaneous phenomena, have failed to be recognised in their true light. On the other hand, all cutaneous eruptions must not be regarded as necessarily evidencing blood poisons, although the acute exanthematous, vesicular, and pustular rashes must always create a suspicion of a constitutional disturbance ; as witness the roseolous and urticarious rashes attendant on so many complaints, as well as those which are sometimes seen accompanying pyæmic and puerperal conditions. What immediately determines the variety of rash is unknown ; why, for example, in one case the capillaries of the skin should be merely congested, as in scarlatina or measles, and why, in another, a pustule should occur is undetermined ; as well as why, in the two first-named diseases, the same twigs or groups of capillaries should not be alike affected.

In all these diseases, too, the digestive and bronchial mucous membranes are liable to be involved. The former, probably, in all of them ; although affected in a specific manner in some only, such as typhoid, variola. According to Dr. Fenwick, the stomach is always changed in scarlatina, and thus we might almost assert that in this disease the whole external and internal surfaces are affected. Wherever the eye can rest, whether on skin or mucous membrane, an intense congestion, followed by exfoliation, is seen. In this disease, too, some very marked influence is seen to have been produced on the kidney ; but this is by no means peculiar to scarlatina. In all the specific diseases pyrexia lasts whilst the eruption is present, and the two, as a rule, abate together, a very definite period being fixed for the decline in each disease.

I have said that the whole organs of the body are necessarily affected and thus show disturbance ; not only the kidney just mentioned, but the liver and spleen ; enlargement of the latter, jaundice, and albuminous urine being found present during the fever of many specific diseases. As regards the lungs a congestion invariably occurs, and this is very liable to pass on to a pneumonia ; also a secretion from the bronchial tubes, or bron-

chitis. The brain is an organ which is able at once to manifest its disturbance, but there is no reason to believe that it is more affected than any other organ; thus, the shaving of the head and application of cold in the treatment of typhus has gone out with an improved pathology.

By passing in review some of the more ordinary specific diseases we shall perceive how, in many of the phenomena which are present, they all accord, and thus how they can only be distinguished by taking their history as a whole.

Typhus.—A specific disease having a definite duration; skin affected by a peculiar rash; mucous membrane not characteristically affected, but tongue, stomach, bronchial membrane in a morbid state; stagnations and extravasations of blood on skin, mucous membranes, and all the organs of the body.

Typhoid.—A specific disease of a definite duration, with a peculiar rash mostly present; mucous membranes affected, that of intestine in a characteristic manner; congestion of all the tissues, but not so marked as in typhus.

Smallpox.—A specific disease of definite duration with peculiar rash; the buccal, bronchial, and intestinal mucous membranes affected; congestions, or hæmorrhages, into all the tissues of the body.

Scarlet fever.—A specific disease of definite duration, with peculiar rash; probably the whole of the alimentary canal affected, including the stomach; the kidney more commonly than in other specific diseases.

Measles.—A specific disease of definite duration, with peculiar rash; mucous membranes affected, more especially the bronchial; sequelæ, bronchitis, and diarrhœa; not so marked congestions.

Vaccinia.—A specific disease of definite duration; general pyrexia, with occasional rash and disturbance of alimentary canal.

Syphilis.—A specific disease, having time of incubation succeeded by pyrexia and disturbance of skin and mucous membranes; shown by exanthematous rashes, bronchitis, diarrhœa, &c.

Cholera.—A specific disease; violent onset of symptoms; if not fatal, followed by pyrexia, rash, disturbance of all mucous membranes.

Glanders.—A disease due to a specific poison, attended by

fever, congestion of organs, and accompanied by a pustular eruption on skin and affection of mucous membranes.

Yellow fever.—A disease where eruptions or hæmorrhages occur, as in typhus or variola, seen by petechiæ on skin and vascularity of mucous membranes, with vomiting, &c.

Plague.—Characterised by glandular swellings, and accompanied by redness and congestion of mucous membranes, with petechiæ, sanguineous vomiting, and diarrhœa.

In the lower animals there is—

Variola amongst sheep.—Pustules on skin, with falling off of wool, discharge from nose and eyes.

Malignant pustule, or Milzbrand.—A specific disease in which similar congestions take place.

Purples, or scarlatina of pigs.—Characterised by a cutaneous eruption, at first red and afterwards purple, with extravasation of blood into the muscles and viscera.

Rinderpest, or cattle plague.—In which there is eruption of skin, inflammation of mucous membranes, and congestion and stagnation of blood.

It will be seen that, in order to establish the peculiarity of any specific disease, we should prove that it can produce no other ailment but one of its own kind, and that it has a history of its own. It is not sufficient that we should discover an identity between certain symptoms, seeing that in all these specific diseases there is very much in common. Thus, the similarity between the condition of the internal organs in cattle plague and variola is not sufficient to establish their identity, nor some likeness of the rash to make the purples of the pig a scarlatina; nor can one or two symptoms be taken alone in order to establish the sameness of typhus and typhoid. Again, it is highly probable that there are specific diseases which, not yet having received a name, are placed in the category of some common disorder as typhoid. In the latter, as is well known, we meet with about 20 per cent. of cases without a rash, and thus we are obliged to rely on the other symptoms for a diagnosis. If, in these exceptional cases, the diarrhœa be not well marked, we have an example of the disease which is very ill defined. Consequently, any case of illness accompanied by much fever, and having no very characteristic symptom, is apt

to receive the name of typhoid, and I have no doubt that it is often made to include many others than the true form of the complaint. A very important inquiry would be to discover what symptoms are common to all specific diseases, and what are peculiar and characteristic. The fever is always present, with disturbance of all the functions of the body, congestions with a disposition to hæmorrhages, and at same time changes in the skin and alimentary canal. The feverishness or pyrexia is not only universal in these specific diseases, but is attendant upon all local inflammations or phlegmasiæ, and thus in itself possesses no characteristics, yet, unfortunately, it has been made the basis of nomenclature of some of these complaints. This is a circumstance I regard as the most unfortunate which has ever occurred in the history of medicine, and as having done more than any other single error to obscure the vision of learned and discriminating men. Even at the present day the term fever is often used (as in olden times by Celsus) as a peculiar form of disease, and also as a mere condition attendant on several maladies.

What is meant by the feverish state, or feverishness, is a condition recognisable by certain well-marked symptoms, as increased temperature, quickened pulse, furred tongue, anorexia, &c., seen most markedly in the specific diseases where it is believed to be due to tissue change, but also in the phlegmasiæ and local inflammations where it is associated with cell-growth. Now, I am not aware that any one has ever asserted that this fever is greater in typhus or typhoid than in variola or pneumonia, and yet the term has been applied almost exclusively to the former; the reason apparently being that there were present in these maladies no very definite symptoms to suggest a characteristic name. As I have before said, we have a number of specific diseases due to definite causes, and attended mostly by characteristic rashes; thus, it is not surprising that smallpox soon received a name, or scarlatina, but in those cases where there were no such striking appearances present, the attendant physician was fain to note the pyrexia only, and thus gave the term fever to a few diseases, although the condition was common to all. This residuum of disease without a name was styled common continued fever in our country, to which were added several more in tropical climates; these

fevers were soon found to consist of varieties, which at the present day many believe to be distinct diseases. The term fever almost up to the present time has combined together typhus and typhoid, which have nothing in common except the pyrexia, and therefore there is an equal right to add to them scarlet fever, which is already done by the public. We smile at the ignorance of the latter when we hear that fever is raging in a neighbourhood, and we are quite uncertain as to whether it may be typhoid or scarlatina, and yet the same term, fever, undoubtedly biases the profession in the same way; for it is only in these two forms of disease (as I have before mentioned) that we hear the subject of drainage discussed as a probable cause of their prevalence, but never when measles, smallpox, or diphtheria is raging. Would this be the case if these diseases were styled rubeoloid, varioloid, or diphtheritic fever? That the profession is tied hand and foot by the term there can be no doubt, for those who maintain that typhus and typhoid are distinct diseases write of them in contiguous chapters, or in the same monograph; whereas, according to their own showing, they might with equal propriety write a work in which they should treat of the measles and smallpox together. In order to break up this confused mass of disease, known under the name of fevers, it would be as well to separate them as widely as possible in our writings and in our lectures. I much regret that Sir W. Jenner, when he gave his great analytical powers to the subject, did not invent some new names, and that Dr. Murchison did not, instead of the term pythogenic (to which I have no objection in the sense in which he uses it), adopt a substantive expression. We should thus have been able to abolish for ever the term fever as indicative of any special disease. If any one can frame a good and easy synonym for typhoid, he will be a benefactor to the profession; I will be one of the first to adopt it, and discard for ever the expression fever. We shall then have, in treating of the specific diseases, a number of names whereby they can be recognised, and cause them to stand out distinctly, without any fear of confounding them with one another; we shall have typhus, smallpox, scarlatina, measles, enterica¹ (provisional for typhoid), ague, syphilis, &c.

¹ I think it a matter of little moment what term is adopted so long as we can label the disease with a substantive name. I suggest the word "enterica," because

The confusion would not be so great as it is at present if we detached the term fever from the phlegmasiæ, and limited it entirely to the specific diseases, and then we should have, instead of the above list, brain fever, varioloid fever, scarlet fever, rubeoloid fever, typhoid fever, intermittent fever, ladies' fever, &c. Under these circumstances, however, we could no longer use such terms as rheumatic fever or puerperal fever. If there be those who are in love with the term fever, and would use it under all circumstances, the evil might be cured, for it would lose then the partial definiteness which it at present possesses, and we should then be obliged to extend it to the phlegmasiæ and adopt such expressions as pulmonary or pleuritic fever. I think, however, the mode of extrication out of the present maze is not difficult by maintaining the older expressions for phlegmasiæ, and using distinctive titles for the specific diseases, and this can at once be done by a substantive designation for "typhoid." If this were accomplished I believe it would at once remove the shackles which have hitherto impeded us in our path of inquiry, and that we should get a much clearer notion of many forms of disease. As at the present time it seems almost an impossibility to frame a new name irrespective of a theory, I would, rather than preserve the present nomenclature, follow American fashion, and ticket our diseases as No.'s 1, 2, 3, &c.

As regards the other "fevers" I have named the difficulty will be less in removing them, as the importance of so doing is not so great. For puerperal fever another expression might be easily attainable; as also for the gastric fever of children, which is either the complaint known as 'typhoid' or no specific disease at all.

As regards rheumatic fever it would not only be advisable to abolish the name, but that of rheumatism as well, unless, indeed, it could be confined to this complaint alone. Under this name we generally recognise a peculiar affection in which it is thought that the blood is charged with lactic acid, and in which the joints become swollen and painful; but there are a number of blood diseases in which the joints are also affected, as for

nearest to one already in use, and I do not know why it should not be used substantively, but I should not object to "pythogenia" out of compliment to Dr. Murchison, or even to such an expression as "pyrentery" or "pyretilia," in remembrance of the obsolete term fever.

instance, in gout from presence of uric acid. We may also see a swelling of the joints in gonorrhœa; it is also common enough in lying-in women; also as a sequel to scarlatina; and sometimes in spinal affections. To the first named of these diseases we give the term rheumatism, and in this *par excellence* the joints are affected; but why in other complaints where the joints are involved we should use the term rheumatic or rheumatoid is not very obvious, but the fact has certainly been fraught with much harm. The term rheumatic has at the present time at least a threefold meaning. It is used in the first place as applicable to the morbid states which may occur in the disease known as acute rheumatism, and we speak of a rheumatic affection of the heart, of the spinal cord, or sclerotic, as of a peculiar pathological process. It is also used in the most general sense as equivalent to the word painful; and thus muscular and nervous pains are often called rheumatic. At other times the term is used without any reference to the nature of the complaint, but simply to the seat; and thus, because in acute rheumatism the joints are affected, so, if in gonorrhœa these same parts become inflamed, we say the patient is affected with gonorrhœal rheumatism, and if the joints and neighbouring bones have undergone a slow chronic change in old people, we say they have chronic rheumatic arthritis. It is impossible under these circumstances to define the meaning of the term rheumatism, and it is a melancholy task when teaching the uninitiated to be obliged to implant in their minds such empty phrases, and be an unwilling agent in assisting to perpetuate them.

ON TEMPERAMENTS.

As far as we know the specific diseases of which we have been speaking may attack persons of all temperaments, although the spread of some epidemics in particular latitudes would seem to show that the circumstances of climate and race do possess an influence in their propagation. Even diseases which are less uniform in their character, but have their origin in some definite external cause, seem capable of attacking all alike; I allude to such maladies as dysentery or ague. Then if

we come to some of the more ordinary causes of disease, which are always surrounding us, such as vicissitudes of temperature, we find the proneness to their influence depends much on the constitution and habits of the individual, and the nature of their effect on his temperament. We then arrive at other diseases which, acute in their character, and apparently dependent on some outward trivial circumstance, yet have their origin altogether within, arising from some long-standing or inherent evil in the body. We thus constantly have the proposition before us, does the disease wholly arise from without, or wholly from within; is it due in part to an external agency, and in part to the peculiar constitution of the patient, and how much to each?

In ancient times, when the morbid changes in the various organs of the body were known, and physicians were exclusively employed in the observation of the external phenomena displayed by the sick man, it is evident that the peculiarities presented by individuals who were prone to the same diseases would be more studied. Thus, the internal complaint being unrecognised, the general appearance of the patient was more regarded, and supposed to be intimately connected with the disease from which he suffered. These external appearances, associated with certain liabilities to disease, gave rise to the doctrine of temperaments, and so from Hippocrates downwards this has constituted a very important part of the teaching of the schools. Of late years the study of pathology and of the etiology of disease has tended very much to fix our attention on particular organs, and made us ready to discover some special cause for their disposition to morbid change; as for example, when we say pneumonia, pleurisy, or consumption is produced by cold, disease of the liver by drinking alcoholic stimulants, dyspepsia or diarrhoea by eating improper food. But we have only to remember that these same agencies are inoperative in some persons to be aware that there must be another element in the causation to be considered. If we see a man of middle age shattered in health, and his whole nervous system giving way in consequence of close application to business, vexations of public life, and antagonism of opinion, we may readily attribute the disease to these circumstances; but we have only to remember that there are such men as Lord Brougham to know

that the constitution of the patient was the more potent cause in the result. During the last year it has twice occurred to me to witness rheumatic fever arise whilst the patient was in bed, and in no way exposed to cold, the predisposition to the disease being strongly present in each case. Such facts compel us to acknowledge, as all men of experience must, the peculiar susceptibilities to disease in different individuals, and that persons of a certain conformation are more liable to one class of ailments than another; and yet, singularly enough, with one or two exceptions, our teachers of medicine seem almost to have forgotten the doctrine of temperaments, which occupied so large a part of the old schools of education.

One reason for this neglect may be found in the fact that the class of temperaments as framed by the ancients no longer strictly applies to modern times, for not only may the temperaments observed amongst the inhabitants of ancient Greece and Rome be different from those of England, but in our own country these may have altered in the lapse of centuries. Among the older medical writers in this country the subject of individual constitution was much discussed, and the doctrines now included under the name of Darwinian were not altogether overlooked.¹ For instance, if the different races of mankind have sprung from the same parents, the peculiarities which they present must have arisen from the circumstances in which they were placed, just as is thought to be seen at the present day in the influence which the American climate has had on the Anglo-Saxon. Had a medical man to extend his sphere of practice over the world, it would be absolutely necessary for him to have a knowledge of the peculiarities of the different races which inhabit it, but since his operations are limited to one small space, he has only to consider the varieties of man which exist therein. These varieties of the same race are distinguished by temperament. Where the conditions of living are uniform as

¹ "In a state of nature the race of all gregarious animals is probably progressively improving, as far as is consistent with their capacity for improvement. The strongest male becomes the 'vir gregis,' and consequently the father of most of the offspring. In the ruder state of human society, or rather in its earliest formation, something of the same kind may prevail, but in a more advanced stage sufficient provision is made by the preference which health and intellect will for the most part produce in either sex."—ADAMS.

in savage countries, the individuals appear to be much alike and equally susceptible to particular ailments; in these countries the occupations are of the same nature, and the food often either wholly meat, fish or vegetable. Thus we hear of single diseases, as leprosy, plague, cholera, &c., causing mortality, rather than of the variety of ailments met with in more civilised life.

The causes which produced a variety of races in different countries would be in operation, though in a less degree, over smaller spheres, and be sufficient to stamp a mark on the inhabitants of so small a region as England; thus the people of the flat and agricultural districts of the eastern counties would differ from those engaged with the mineral wealth of the midland, and these again from the inhabitants of the western and more mountainous districts. No doubt in our own country traces of the original nations may be found, and in certain individuals there may be more of the Norman, Saxon, Dane, or Celt. Whatever the circumstances may have been which have produced the variety of mankind, the question is not one of mere speculative interest but has its practical bearings for medical men; since these varieties have their special inclinations towards particular diseases. There would be a problem solved of great importance if we had for example a knowledge of the conditions under which the tuberculous temperament came into existence. It may be that the character of the soil or the food on which the individual lives tends to produce those peculiarities which in a few generations are sufficient to constitute the particular temperament; but whether an Englishman would altogether lose his characteristics by a migration to a warm climate like that of Italy, and the Italian change his nationality by a similar transplantation here, may be a question, since there are those who with Dr. Knox believe that the peculiar qualities of a race are never lost. What the influence of climate, however, must be, can be gathered from the deviations from health witnessed in our own country when, as in the late hot summer, gastric and hepatic disturbances were rife, and as regarded physical and mental energy we constantly heard the remark that less work could be done, and some even gained an insight into the pleasures of sitting cross-legged all day long, drinking coffee and smoking a hookah.

I say that if we could discover under what circumstances the

various constitutions or temperaments of man have come about—what for example have produced the melancholic, the gouty or the tuberculous, we should be in a position to place our patients under the most favorable conditions to prevent the development of the disease to which they are prone. This is what we all practically do when we send a person liable to consumption to a locality where the disease is unknown.

Much might be said on this interesting topic, and I only allude to it because I believe it tends to show why the subject of diathesis has been so little dwelt on by modern writers. It is not only that our closer regard to pathological changes has caused us to overlook it, but it has become obscured by the Hippocratic divisions being no longer altogether applicable at the present day, and by the temperaments varying in different countries and probably undergoing alterations in our own.

A knowledge of the particular temperament to which an individual belongs affords an acquaintance also with the diseases to which he is liable, there being a tendency always to morbid changes in some particular direction. We thus have in our hands treatment of a prophylactic nature, most important means of diagnosis, and by connecting the habits of the individual with his temperament a more accurate idea of the duration of life for purposes of insurance. The peculiarities both of health and disease being transmitted from father to son are too well known to require any illustration, and the same appears to be true of all classes in the animal kingdom; for, as Youatt says, "There is scarcely a malady to which the horse is subject which is not hereditary."

I know of no writer of late years who has reduced the subject to a system but Professor Laycock, and I cannot do better than refer my readers to his writings for information; as regards myself I intend merely to note here some of the observations which time has taught me to be correct, without attempting to systematise on a matter with which I am imperfectly acquainted. Whether at a future time I shall adopt the Professor's division or see reason to modify it I cannot at present say. There is one part of the subject on which I formed a very strong opinion at the earliest period of my medical career, that so-called exciting causes were of trifling moment compared with those causes which had their origin within, for I was much struck with the

fact that a post-mortem examination repeatedly revealed a long-standing complaint in a person who was said to have been ill only a few days. Thus, for example, cases of internal obstruction of the bowel, almost invariably due to old adhesions, were attributed, in the absence of an examination after death, to intussusception, blows, falls, cold, or pork. When, therefore, I heard an essay read at a medical society, on the importance of treating acute disease lest it should become chronic, I was induced to write a short paper in this work¹ inculcating the opposite doctrine, or the importance of arresting chronic disease before it became acute. I was not then aware that I had been anticipated by the father of medicine himself. Hippocrates says, "Diseases do not fall upon men instantaneously, but being collected by slow degrees they explode with accumulated force." I believe if there be one truth in medicine more important than another it is this, and yet it is one which is perpetually forgotten.

The ancient writers and their successors for many generations divided civilised man into four varieties according as he had a superfluity of blood, of phlegm, of yellow bile, or of black bile; believing that the first was supplied by the heart, the second by the head, the third by the liver, and the fourth by the spleen. In accordance with this view these varieties were known as the sanguineous, the phlegmatic, the choleric, and the melancholic temperaments. The idea conveyed by these terms was that one organ of the body was in more powerful operation than the others, and had a preponderating influence in the whole being. A combination of these influences, where they all were tempered by one another, would be found only in the perfect or model man. Although these terms have ceased to have their original meaning there is sufficient truth expressed by them to see that they still retain much of their force.

Thus the man of sanguineous temperament would be in possession of all those attributes which bring long life and happiness. His physique would be good, he would be tall, with large chest, of commanding presence and quick circulation, fond of good living, having body and mind active, of strong perception, given to generous impulses, and an agreeable member of society. A man of choleric or bilious temperament would be less vivacious, would possess less activity of mind and body, but greater powers

¹ Series iii, vol. iv.

of endurance; his body and mind would not be formed in so pleasing a mould, he would exhibit more irritability, and his temper would be irascible, and digestive powers weak or capricious. A combination of these two temperaments has been said to have produced the greatest number of men of eminence,—those who have united great powers of endurance with much energy of character. The leucophlegmatic would include the dull, heavy people, slow in body and mind,—those who at an early period of life are now called scrofulous. It will be seen that to a certain extent a particular kind of temperament prevails in one country rather than another; and thus in popular language we speak of the choleric Irishman and of the leucophlegmatic Scotchman.

At the present day some of these terms are adopted and others have come into use. Commonly they have only a general significance and are not used with any precision; but we understand by the expression “sanguine,” a person who is full-blooded, light-complexioned, and ardent; by that of leucophlegmatic one who is lethargic, and pasty-looking; by that of melancholic one who is dark-complexioned or swarthy and irascible. Other expressions which have come into use have had reference to the peculiar diseases which are apt to be developed in that particular disposition, and thus we speak of a class of persons whose ancestry have had gout and who are themselves predisposed to it as of the gouty diathesis, of those predisposed to consumption as of the tuberculous diathesis, and of those prone to nervous diseases as of the nervous diathesis. It may be observed that the peculiarities attendant on each temperament are prone to develop themselves at different ages; as the nervous in the very young, the tubercular at the commencement of adult age, and the gouty in advancing years.

Professor Laycock particularly dwells upon the diatheses known as the arthritic, the strumous, the nervous, the bilious, and the lymphatic. As regards the first, or arthritic, there can be no doubt that it is one of the most pronounced, and I believe we are right in distinguishing the nervous. I am strongly of opinion that the two characters of persons described under the term strumous belong to different diatheses, and that the separation made by Sir W. Jenner into the strumous and the tubercular is rigorously correct.

Under the term *strumous* there have generally been included two very different outward conditions, so that on theoretical grounds, when a student, I had a difficulty in associating the two together, and failed to understand how the small ill-developed child with pot-belly, crooked legs, blear eyes, sore lips, enlarged lymphatic glands, and decayed teeth, altogether dull in mind and body, could be identified with the young person twenty years of age dying of consumption, who was tall, well-developed, with straight limbs, fine skin, good teeth, and with a highly active intellect. The difficulty was endeavoured to be overcome by Sir T. Watson in the description of two varieties of the diathesis. These have been considered by Sir W. Jenner as altogether different, and I am of the same opinion, seeing that the conformations are so opposite, and the diseases to which they are liable are unlike. The passage from the first-named author is as follows :—"The persons in whom scrofulous disease is most apt to declare itself are marked during childhood by pale and pasty complexions, large heads, narrow chests, protuberant bellies, soft and flabby muscles, and a languid and feeble circulation. They present many of the features belonging to that pattern of body which is denominated the leucophlegmatic. But the strumous disposition very often indeed accompanies a variety of the sanguine temperament also; and is indicated by light or red hair, grey or blue eyes with large and sluggish pupils, and long silky eyelashes, a fair transparent brilliancy of skin, and rosy cheeks. This red colour which is well defined in general, is easily changed, however, by cold to purple or livid; the skin is thin and readily irritated; the sclerotic has often a peculiar pearly lustre, and the extremities are subject to chilblains. Such children are many of them extremely clever and ready of apprehension, of eager tempers, and warm affections, lively, ardent, imaginative, and susceptible. This precocity of mind and intellect, while it delights the fondness of the parent, awakens the fears of the more far-seeing physician." I feel convinced that there are here described two such different varieties of constitution, as to deserve the name of distinct temperaments, for I think the strumous child possesses peculiarities of constitution and tendencies to disease observable through a long life-time, which do not partake of those seen in the tubercular. The difference at the time of

childhood is usually one of contrast; the scrofulous child is ill-formed, with large head, protuberant abdomen, often narrow chest, and crooked legs; narrow jaw with teeth irregularly set and prone to decay; the skin harsh and apt to desquamate, mucous membrane also liable to irritation, sore eyes and nose, or a discharge from the ears; lymphatic glands disposed to enlarge; mind sluggish. As the child grows up the same characteristics may be witnessed in the lethargic operations both in body and mind.

The *tuberculous* diathesis is remarkably different. It is characterised by a superlative activity of bodily and mental functions. The child at the earliest observable period is precocious, it walks and talks soon, and cuts its teeth early. It is well formed as regards the frame-work or skeleton. The head of good shape, teeth absolutely perfect, features cut in a fine mould. Chest very commonly of good formation, or having some peculiarities which Sir W. Jenner has described, and which my own observations confirm; being broad and flat, with the sternum somewhat depressed. This, of course, is not always the form of chest met with in the subjects of tuberculous consumption, for occasionally owing to various causes of impoverishment operating in infancy, the lungs may not have fully expanded, and the chest will be found projected forwards somewhat after the manner of the pigeon breast of rickets, or be simply narrowed from want of development. In the most marked cases of tuberculous phthisis, the first-mentioned broad flat chest is the one that we most generally meet with. Then, again, the skin is fair and thin, eyes mostly blue or grey (the blue belonging rather to the scrofulous, and the grey to the tubercular), pupil large and eyelashes long. The infant is pretty, the adult good-looking. The child is precocious, and throughout youth the mind is active, and an enormous amount of knowledge is consumed; at a later period the young man may carry off all the prizes at his college, and then perhaps sink into an early grave. The subject then of tuberculous phthisis or he who is prone to it, presents a finely formed frame, straight limbs, well-made head and broad chest; he may be thin and somewhat delicate, but in no wise can be called underbred, puny, or ill-developed, seeing that the opposite are his characteristics.

The *gouty* or *arthritic* diathesis has peculiarities equally marked with those of the tuberculous, and like it, more strongly pronounced when the peculiar morbid changes are actually in operation. It is thus very often overlooked in the youth, or female, and more especially noticed in the male adult, when some effects of the diathesis have become apparent. Since my friend, Dr. Sutton, has drawn my attention to the fact, I have found he is right in saying that it is children of this diathesis who are liable to epistaxis and other forms of hæmorrhage. The man of gouty diathesis is often he who has been already spoken of as of the sanguineous diathesis, or as the model Englishman. He is well grown, with large chest and abdomen, active in his movements, and eminently social in his habits. He has a great proclivity, as the years roll on, to certain changes in his tissues, and these are mostly of the fibroid or fatty kind; he is liable to cirrhosis of the liver, Bright's disease, and fatty degeneration of the heart and blood-vessels. He is inclined to be stout, and to be marked with red blotches of varicose vessels on his face. He may have actual deposit of chalk in his joints, but his hands and feet are usually small—the skin being smooth or unctuous. His hair turns grey early; the teeth decay soon and become much worn, as if a section had been made transversely through them; and in connection with this the readers of 'Graves' Clinical Lectures' may remember that he associates "grinding of the teeth" with gout. "In a paper inserted in the 'Dublin Medical Journal, 1836,' I noticed the morbid habit which some individuals have of grinding their teeth, and detailed some facts in illustration of this affection. I have now seen several cases of the kind, and I have observed that they all occurred in persons of the gouty diathesis. The grinding of the teeth continues for years, and produces very remarkable changes in the conformation of these organs affecting sometimes one side of the jaw, sometimes both, so that in confirmed cases we frequently find the teeth ground down to the level of the gums. There is not at the present moment the slightest doubt in my mind that the irritable state of the dental nerves, which gives rise to the irresistible tendency to grind the teeth, depends chiefly on the existence of gout in the constitution."

Care must be taken not to confound the gouty diathesis with

the gouty cachexia, for at the time when the subject of it comes before us professionally, he usually has some of his inherent tendencies developed into actual disease. Then the question may arise as to the real cause of many of the phenomena which we observe. Thus, the stigmata or congeries of congested or varicose capillaries witnessed on the body and the face, I have seen by one observer attributed to the gouty diathesis, by another to alcoholism, and by a third regarded as symptomatic of hepatic disease; indeed I have seen a fourth look at such a man and simply declare that he had the atheromatous expression. This may merely prove that the very causes which tended, in the first place, to produce the diathesis, are the same as those which bring into play its peculiar liabilities to disease. There may be the tendency to a disease of the smaller blood-vessels, and yet its actual production may be caused by an abuse of spirits; certain it is that without any marked gouty diathesis, the drunkard with the cirrhotic liver has a most remarkable condition of the whole of the smaller blood-vessels; this is seen in the congested patches of the skin and the deep red hue of the mucous membrane of the mouth, throat, and stomach.¹

Bilious arthritic or *asthenic arthritic* is a term which Dr. Laycock applies to a diathesis which I believe is equally well marked with any division of the constitution deserving the name of temperament—at least I recognise a class of persons who are remarkably alike in all features of body and mind, to whom I believe the above appellation will apply. They are very different from the sthenic arthritic in being men of smaller make, they are mostly of dark complexion, of great activity, both physically and mentally, and have a delicate appearance. They are liable to hæmorrhages, and some members of the family may have died of consumption, so that I have long been in the habit of regarding such persons as being compounded of the arthritic and tuberculous diatheses.

¹ As I have before remarked in this volume, the pathology of the tissues should be studied rather than the changes in one particular organ; if this were done we should not see a case of hysteria placed in the same category as one of tubercular arachnitis or sanguineous apoplexy. The first may properly be styled a nervous disease, but the second is a constitutional one of another character, and the third is vascular. Placing a case of sanguineous apoplexy in the list of nervous diseases may answer for the artificial division of the Registrar-General, but it has no natural place there.

The *nervous* temperament is also one which deserves a place; very often it is none other than the tuberculous, but being met with in persons not of this diathesis, the term is one which must be used. The general conformation of the face and head is one of refinement, and the antagonism to such a temperament would be simply one of idiocy,—where the head is small, forehead retreating, chin receding, jaws narrow, and teeth projecting. Dr. Laycock lays stress, as features of the nervous temperament, upon a long upper lip, a good angular chin and a pendent lobe to the ear.

The *melancholic* or bilious temperament is observed in persons of dark complexion, and who are inclined to hepatic disorders. They are of irritable temper, and take a gloomy view of the affairs of life.

I do not pretend in these few pages to do more than insist upon the importance of the recognition of the temperaments, with the practical object of being able to arrest the peculiar tendencies to disease which each may present; for at the present time, when the medical man has become the custodian of the public health, he has some other duty to perform than to recognise the existence of disease; he is obliged to seek for its causes and study the means of counteracting it. As the adviser of a family and acquainted with all the peculiarities of its members, his profession has become one which is rather a study of mankind; he should be a physiologist in the largest and profoundest sense, including in the term physiognomist, and phrenologist or psychologist.

From this point of view, taking man as a whole, every feature of his character is worth consideration, and then it will be found how human beings can be sorted into different classes, alike in external appearance, mental peculiarities, habits and even dress. There are those who pretend to trace the character from the hand and others from the writing; and no doubt much knowledge can be gained from each. Thus, the small hand with tapering fingers in our old aristocratic families implies an abstinence from manual labour for many centuries, just as the same form of hand implies the same conditions in the gipsy, whereas the large “protestant” hand implies that the owner has worked hard and owed his independence to his own exertions. Thus, man in his whole character and acts is not unworthy of

our study. As the subject is a large one, I will allude only to a few points which are noticeable in individuals of some of the temperaments already alluded to.

There is the man of gouty diathesis, having the conformation spoken of, well made, ardent, active in mind and body. When such a person comes before us in our medical capacity, we already know his habits and what treatment he requires. His digestion is good, and he has a strong love for malt liquor and wine; he talks of his glasses of sherry at lunch and dinner as an ordinary necessity, to say nothing of the port consumed afterwards. It is dangerous to speak of claret or light wines to him, for he loathes the name. If port wine is proscribed he nevertheless loves it, and will make it the subject of conversation during his dinner. These circumstances suggest the question, which has been answered in very different ways, whether the prompting of one's appetite for a particular article of diet does not warrant the necessity for its use. For my part I should say no, and that the love of strong drinks inherent in the gouty man is the cause of the development of those troubles which the natural temperament is disposed to entail. The inordinate use of them has probably, in the course of generations, produced the diathesis, and the abuse of them by the individual develops the ailments to which he is born predisposed.

Now let us look at the man of tuberculous temperament. When he comes into my study I can speak with as much certainty about his dislike to alcoholic drinks as I could of a gouty man's fondness for them. He has a weak digestion and capricious appetite; although fond of meat and farinaceous food he can eat no fat, and has no liking for beer or wines. The young girls and boys of the tuberculous temperament declare that these beverages "get into their heads," and if forced to drink anything take a little claret and water. I find I am always safe with them on the subject of claret. I often find that young men who are professed teetotallers are of this temperament. Whereupon I judge that their reasons for abstinence have been prompted mostly by their own feelings. It might be thought that on this supposition the Temperance Assurance Society would show an increased mortality from the greater risk of consumption, and that a temperance tea meeting would present a fine selection of persons of the tuberculous diathesis, whilst

the guests at the neighbouring city dinner would present good specimens of those of the arthritic diathesis. Strange or absurd as the idea may seem I believe that it is theoretically true, but loses in great measure the practical result which would ensue from it, from the fact that many good men, as clergymen and others (credit to their names) have sacrificed their own tastes for the good of their fellow-creatures, and as regards the statistics of a temperance society it must be remembered that many who sign the pledge are reclaimed drunkards. The fact, however, remains that young persons of the tuberculous temperament dislike fermented and alcoholic beverages as they do fat articles of food, and I believe just as the gouty man tends to develop his morbid dispositions by following his taste for drink, so does the tuberculous youth hasten the catastrophe by his abstinence. And on the contrary, just as the one may keep his gout in abeyance by restraint, so may the other tend to counteract the development of tubercle by eating of fat and drinking of wine.

There is, in the matter of exercise, another point of contrast besides the love of the one for good living and rich dishes, and the delicate feeding of the other. A sedentary life tends to develop gout; a too active one tubercle. We may note that young people of the tuberculous diathesis are eminently good walkers; they love pedestrianism for its own sake, and talk lightly of their thirty miles a day. Let a man of arthritic diathesis follow his inclinations, and the gout will soon be developed. Let the tuberculous young man do as inclination bids, feed sparingly, avoid all fats, beer and wine, and do a large amount of work bodily and mentally, and he will fall into a consumption.

These and other matters which may be considered trivial are really of the utmost importance in considering the disposition or temperament of any young person, for a knowledge of them may enable us to ward off disease. As regards the tuberculous diathesis, its peculiarities, and consequently the means which should be prescribed to counteract its evil effects, I believe that most erroneous opinions have been held by many writers on the subject. There has been a too general consent in the profession to what I may call the popular view, which may be seen in all its perfection in the writings of the notorious

"Hunter." The opinions expressed therein agree in the main with those held by more than one writer on consumption, and which appeal to the *common* sense of mankind. They are that children born to consumption are underbred, puny, with ill-formed chests, &c., and that the disease is developed by want of good air, exercise, &c. The treatment would consequently be in accordance with Hunter's; a good expansion of the chest and the breathing of a pure or over-oxygenated air into the lungs. Such is the general tenour of the writings of more than one author on the subject of consumption, and patients are to be found adopting extraordinary means to inflate their lungs and expand their chests to the utmost.

My own opinions respecting the causes of development of tubercular disease are in entire antagonism with these. Whatever view may be correct, there can be no evading the fact that the most contrary opinions are held with respect to this subject, and opposed methods of treatment recommended. This should not be. For example, a young man, knowing he comes of a tuberculous family and having a suspicion of some delicacy of the lungs, consults a distinguished London physician as to the best means of warding off disease, and he recommends all kinds of athletic exercises, as rowing and using dumb-bells, so as to expand the lungs, and approves of the singing of which the young man is fond. The latter meets another medical man or friend who informs him that tubercular development is best prevented by abstaining from all those measures which had just been prescribed; not satisfied, he consults a third, who tells him that he may use exercise in moderation,—a very safe prescription, but one which shows him clearly that the man who can only "split the difference" has an opinion worth nothing. I think it can scarcely be said that it is of little moment whether the questioner in this case makes an increased use of his lungs or practises as much quietude for them as possible, and, if so, it surely follows that our patients must sometimes receive very injurious advice. A want of agreement as to so common a disease as consumption I take as a disgrace to medicine in the nineteenth century, and hold that a good rule of practice in this matter is of vastly more importance than all the vaunted remedies for the disease put together.

I have already said sufficient to show what my own views of

the subject are : they are opinions long held and acted on as well as confirmed by experience. In the first place, it is not true that the young man or woman who dies of consumption is a puny, ill-developed creature ; he or she is a handsome lad or beautiful girl, well formed, straight limbed, broad-chested, and consequently with good-sized lungs, and is of great activity both of mind and body ; indeed in making a comparison with the lower animals would be styled well-bred or over-bred. Under these circumstances, the natural inference would be that the lung is as much exercised as in any other individual ; certainly there is no reason to assume that it is less worked. As a matter of observation on this point for many years past, I have had no reason to believe that the subjects of consumption have made less use of their lungs than other people. It has also appeared to me a fact of the strangest character that such an opinion of the development of tubercle from a want of free use of the lung should have been broached with the circumstance staring us in the face that it occurs mostly at that time when childhood is passed, and the chest is undergoing expansion. My own opinion has always been in accord with that of my late colleague Dr. Barlow, that tubercle is developed in an organ according to its activity, a fact of the utmost practical importance. Thus in a very capital and original article in this work,¹ on the laws which regulate the development of tubercle, the author says "I feel that whatever advances may have been made in the art of fixing the seat or describing the size of a vomical cavity, we have as yet made little advance towards the determining the condition of the lung—as regards function, nutrition, and circulation,—which is most favorable or most opposed to the establishment of phthisis ; a question which it is of paramount importance to determine before we can propose any rational measures for the prevention of that fatal malady." He then goes on to say "that any organ is most liable to become the seat of tuberculous deposit when its functional and vascular activity bears the greatest ratio to that of the other organs of the body," and shows how the brain is most liable to tubercle in infancy, the abdomen in childhood, and the chest in manhood, when its development takes place. I might allude to another paper by the same author in the same volume on the subject of defective expansion of the lungs in

¹ 'Guy's Hospital Reports,' series i, vol. vii.

cases of small chest, and where he speaks of dropsy and enlargement of the heart, but in no case was tubercle present. Now this opinion propounded by Dr. Barlow more than twenty-five years ago, of the incentive to the growth of tubercle in the lungs being their activity, and the cause of its retardation the sluggishness of the organ, is confirmed by the observations of Rokitsansky. "The relation to tubercle of venosity (that is, an habitual preponderance of venous blood in the system) and of cyanosis as resulting from mechanical hindrance at the centres of the organs of circulation and of respiration is of paramount interest and even of great practical importance. The remarkable exemption from tubercle brought about by these conditions induces us to set forth the relevant facts as nearly as may be in their natural order. They determine the *venous* constitution in various ways, generally conforming in this that they prevent the arterializing of a sufficiency of blood, &c." This pathologist then goes on to remark that persons with disease of the heart, congenital or acquired, do not contract tuberculosis, nor those in whom the chest is contracted. "The increased density of the lungs produced by coarctation of the thoracic spaces in higher grades of lateral curvature of the spine, or in the rickety chicken breast excludes tuberculosis. Nay, it is an important fact that with the establishment of a deformity of the spine in the shape of a gibbosity, even when owing to tuberculous caries of the vertebræ, the tubercle crasis is for ever rooted out in consequence of the narrowing of the thoracic spaces."

Mr. Simon, in his lectures on pathology, was led to the same view of the antecedent conditions of tubercle, and alludes to Rokitsansky's views in the following words:—"I told you that Rokitsansky attaches great importance to an increased *venosity* of the blood as an antagonistic condition to the formation of tubercle, and under this head he includes every influence which interferes directly or indirectly with oxygenation of the blood, either by diminishing the capacity of the chest, or hindering the expansion of the lungs, or by deranging the pulmonary circulation of blood, or by impeding the free access of air thereunto." He then propounds various reasons for supposing that venosity of blood precludes the tendency to tubercular deposition, and that tubercles form where lymph and blood get their first opportunities of increased oxidation; that the scrofulous diathesis

consists in an inherited peculiarity of blood development under the influence of which the nascent blood tends to molecular death, in the formation of tubercular matter, by superoxidation. He then alludes to the disposition to tubercular precipitation being diminished in hot climates where the air is less dense and therefore contains less oxygen in any given volume. To these high authorities I may be allowed to add my own experience, which is quite confirmative of their views; the examination of a considerable number of persons who have died in consequence of deformed chest has never revealed the presence of tubercles; and the fact has on more than one occasion led me to give a favorable prognosis in persons with distorted spines who were thought to be suffering from consumption. I take it that the proneness of tubercle to attack the upper lobes is intimately associated with the greater activity of these parts and that for the same reason the right apex is affected before the left.¹

I think if all these facts be put together they are of a most decisive character as to the conditions which favour the development of tubercle; and yet it must be owned that exactly the opposite views are maintained by writers on consumption. These views so accord with what are styled common sense, popular, or *à priori* opinions, that I cannot but think they have been developed in the study rather than at the bedside. Let us look at the facts once more; here is the child having all those characteristics which Sir T. Watson so well describes. He is a handsome boy, spare but well formed, with good-sized chest and very active circulation, quick in all his movements, fond of exercise, highly intelligent, giving one the impression of being over- rather than under-bred. He is hereditarily disposed to consumption. When he grows to be a young man his chest expands and his lungs develop, and in all probability he engages in various athletic pursuits. It is then that tubercle commences to form, and at the upper portions of the lungs which are most used. It might be asked if there be any facts to show that over-exercise of the lungs tends to the growth of tubercle, and I would answer from a general experience that there are certainly as many as could be advanced to prove that quietude had the

¹ Although the statistics of others do not bear me out in the statement, I am strongly impressed with the opinion that disease very much more frequently commences in the right lung.

same tendency. I have only to carry my memory back to the cases of several young men, long dead, whom I knew, and who were experts on the river; and lately the Newcastle papers were lamenting the death of the champion boatman, who was said to have died of consumption. I have had some little knowledge of two or three systems of quackery, whose authors appealed to the "common" sense of their patients or victims by recommending them to expand their lungs to the utmost or breathe over-oxygenated air; and I know that those practised upon were made infinitely worse. I believe that Dr. Beddoes many years ago found that a superabundance of oxygen in the air aggravated consumptive maladies, and in accordance with these views we are now told that no better abode for the consumptive can be found than in the Upper Engadine, where the barometer is always several inches below the standard of England.

Then quite in accord with the over-working of the lung tending to the production of tubercle are the opposite facts given by Rokitansky, that deformities of the chest and all conditions which tend to retard due aeration prevent the formation of tubercle. If there be any truth in the efficacy of breathing the air of cowsheds, the explanation can only be in the increased amount of carbonic acid present. Then, again, I have been constantly struck with the fact that children suffering from some local tuberculous disorder, and who subsequently succumb to the internal development of the same, present so little disease in the lungs. The child may have been lying in bed and absolutely at rest for a considerable time, and yet the lungs will show the least amount of disease.

Again, the state of the digestive organs, the inclination towards certain articles of food, and the effects of medicines,—all assist in corroborating the view of the nature of the disease which I have taken. With the natural activity of the circulation which exists in those of the tuberculous diathesis, there is a great dislike to fat foods and alcoholic drinks, which one might theoretically suppose would antagonise any tendency to hyperoxygenation of the blood. As a consequence we find these articles of diet eminently useful; cod-liver oil certainly seems to be more efficacious in consumption than in any other disease, and I have every reason to believe that alcohol is

antagonistic to the tuberculous state. It may be true that drunken and debauched individuals die of what is usually styled phthisis, but their form of disease is one rather of chronic pneumonia or fibroid phthisis than tubercular; alcohol I believe to be good as a medicine, and in young children I have administered it with the best success. I would not weaken my argument by bringing forward further illustrations in proof; of cases where players on wind instruments have died of consumption, and of the well-known impunity from this disease of the old stage coachmen, who were sitting on their boxes the whole day and swallowing glasses of spirit at stated intervals.

The active-brained man of tuberculous temperament with his dislike of fat may be contrasted with the scrofulous or leucophlegmatic who has an obtuser intellect and no such prejudices; and thus much truth in the lines of our great Poet:

Fat paunches have lean pates, and dainty bits
Make rich the ribs, but bankrupt quite the wits.

I would strongly maintain that until such views as are here expressed are controverted, and even so long as they are only partially overthrown, it does not behove the medical practitioner, when the consumptive young man requests his advice, to recommend the adoption of every possible method to exercise his chest and inflate his lungs in order to ward off disease. I believe that the want of distinction, between scrofulosis and tuberculosis, has led to much error in this respect, although at all times it has been observed by those who have confounded the two that those children who had external manifestations of disease did not succumb to any internal affection. Sir A. Carlisle, amongst other authors, writes, "I think my experience in the observance of diseases authorises me to conclude that few persons afflicted with scrofulous affections of the superficial lymphatic glands, of the large joints, or bones (when scrofula attacks these parts early in life) are liable to consumption of the lungs." I may add that it is not uncommon to discover scrofulous disease throughout the glands of the body, but without the presence of tubercle or pulmonary phthisis; and on the contrary, in the several hundred post-mortem examinations I have made of cases of phthisis, I should say that it was the exception to find any affection of the lymphatic glands. I think it must be allowed that a case has

been made out sufficiently good to cause those practitioners to hesitate who have regarded the purely scrofulous child as the typical case for consumption, and have then recommended methods of treatment which may be injurious.

In making these few remarks, in order to draw attention to the great value of considering the temperament or constitution of the patient, I would imply that the medical man should be an anthropologist, and make the character of his fellow creature a complete study. There can be no doubt that some of the most eminent and successful practitioners in our profession have been highly gifted with this appreciative faculty, and a moment's glance at their patient has at once revealed to them his character or constitution.

A patient enters the doctor's study, and he observes at a glance his walk, mode of speech, dress, and general demeanour; and has already formed a notion as to the kind of ailment which his patient is about to detail: he will, perhaps, call to mind that he is only another specimen of fifty other patients who seem to have been taken out of the same mould. If this be true, a good history of man and his varieties has yet to be written, and it should not be considered beneath the dignity of a physician to attempt it. If we look around amongst our own medical friends we may meet with many varieties of mankind; there is the man of sanguine temperament arrived at middle age, and who begins to be troubled with the gout; he is very smart in his dress, prone to blue neckties and white waistcoats, and particular as to his hands and feet. He is a *bon vivant*, a good "clubbable" man, takes several glasses of sherry a-day, and recommends the same to his patients, and is fond of his cigar. He most likely drives a male phaeton to go his rounds. I would say, as a matter of fact, that he is given to swearing, but I will not dilate upon this part of his character, since as the members of the tubercular diathesis are not much addicted to this habit, and as it is also declared profanely that those whom the gods love die early, it might imply that persons of the gouty diathesis cannot enjoy much future bliss.

The men of whom Professor Laycock speaks as belonging to the bilious arthritic diathesis I am very familiar with. I know, indeed, several such, and their resemblance to one another is very striking; they are small, thin men, always enveloped in a suit of

black, not seldom a dress-coat, with a large black necktie or stock of the same colour; they are of dark complexion, very active, always on the move, and are driven about shut up in their broughams, where they read intensely; they are not freemasons, not fond of dining out, in fact, unsocial; make money in their professions, and are by no means liable to part with it.

I have said enough to show—what everybody well knows—that the characteristics of man depend very much upon some inherent quality and temperament; these characteristics are no doubt mutually dependent, and thus of the greatest value to be observed. Those who have not made this study are often startled to see certain peculiarities associated together which apparently have no affinity, but which would quite be incompatible with any other characteristics. We must all observe that amongst our patients there are those who apply to us as the “regular doctors,” never dreaming of asking advice elsewhere; there are others who come to us confessing with much discernment that they must wisely submit to the superior opinion of those of any trade or profession who have made it their special study; but there is a third class of persons who will think for themselves, and they consequently throw over everything that is orthodox, and being opposed to any present form of government or established church, would be also homœopaths. There seem, indeed, to be a class of persons doomed to be “quacked.” Literary men seem to be becoming acquainted with the association of particular characteristics; thus in the novel entitled ‘*Monsieur de Camors*,’ we read, “*En politique, mon fils, vous n’ignorez pas que chacun a les principes de son tempérament. Les bilieux sont démagogues, les sanguins sont démocrates et les nerveux sont aristocrates. Vous êtes à la fois sanguin et nerveux. C’est une belle constitution. Elle vous permet de choisir. Vous pouvez, par exemple, être aristocrate pour compte personnel et démocrate pour le compte d’autrui. Vous ne serez pas le seul,*” &c. &c. Observations of a similar kind are to be found in some of the ‘*Saturday Review*’ essays. Thus “There may be observed in the world an immense number of invariable but mysterious existencies of phenomena. Certain sets of conditions are always found side by side, and wherever one of these is discerned its concomitants are sure to be present also, yet we are unable to penetrate into the secret of their connection, or to

discover between them any natural relation of cause and effect. We fail to reach the foundation of the incomprehensible affinity, and are forced to content ourselves with simply recording or observing the fact. Some years ago, for example, it was noticed that enthusiastic friendship for Hungary seemed always to involve unitarianism and homœopathy, and in our own day controversial freethinkers are almost always teetotallers, and wear long hair (tuberculous diathesis?). But there is a yet more notorious affinity which is still more utterly mysterious. A hospitable gentleman one day informed his butler that six clergymen were going to dine with him, and desired him to make due preparation. 'May I ask, sir,' deferentially replied the latter, 'whether they are 'Igh or Low Church?' 'What on earth makes you ask such a question?' 'Because, sir, you see, if they're 'Igh they drink, and if they're Low they eat.'"

In considering the characteristics of persons, we must not, of course, suppose that all are hereditary, since no doubt some come by education, or even from the pursuit of a particular profession. On this subject, Froude has well remarked in one of his essays, "Every one of the many professions has a peculiar character of its own, which, with rare exceptions, it inflicts on those who follow it. There is the shopkeeper type, the manufacturing type, the lawyer type, the medical type, the clerical type, the soldier's, the sailor's. The nature of man is

Like the dyer's hand,

Subdued to what it works in.

and we can distinguish with ease, on the slightest intercourse, to what class a grown person belongs. It is to be seen in his look, in his words, in his tone of thought, his voice, gesture, even in his hand-writing, and in everything he does. Every human employment has its especial moral characteristics, its peculiar temptations, its peculiar influences, of a subtle and not easily analysed kind, and only to be seen in their effects."

I have now written sufficient to show the opinion which I hold of the importance of studying the whole man in order to gain an idea of what he is likely to be as a pathological subject. I may have said little that is new to the general reader, and therefore will make the confession that I have had rather in view the instruction of some of my former pupils, wishing them

to understand that a true pathology needs a recognition of the whole of the relations of man, and would request that, if they have read papers on special pathological subjects by myself in this work, they will now be good enough to supplement them by the present communication.

CONTRIBUTIONS
TO THE
PHYSIOLOGY OF BINOCULAR VISION.

By JOSEPH TOWNE.

SECTION VIII.—I.

It was asserted by Müller, and has to the present day been maintained by eminent physiologists, that we cannot distinguish between the right and the left eyes in the common field of vision; but that when viewed in their associate action, the two eyes must be considered as identical. The results of a series of experiments specially directed to this point, are recorded in our last section; where it was proved, not only that the fields of the right and of the left eyes are separable in the common field of vision, but it was also shown that the different sections or tracts of the retinæ are capable of distinct and separate action; and further that the distinct action of each individual section remains the same, whether it be acting alone or forming an integral part of the entire visual apparatus. Incident upon these inquiries, we had occasion briefly to allude to several facts, relating to provisions *external* to the eyes; we now revert to some of these facts, not merely for the purpose of more complete illustration, but also that we may view them in connection with certain provisions existing *within* the eyes.

In the present section, the retinal fields, viewed in their *binocular relation*, will form the subject matter for consideration; our remarks, therefore, will have reference to phenomena

¹ Continued from vol. xiii of the present series, p. 285.

connected with the different regions of the combined retinal field; and in the diagram prepared in illustration of our views we have placed corresponding halves of the retinae in their *physiological* relation to each other; believing this relation of corresponding sections of the retinae to be fundamental and absolute; and we would premise our observations by stating that the diagram arranged and figured for our purpose should not be regarded as a mere reflex of foregone conclusions, but rather as the result of individual investigation; and in vindication of our views upon this part of the subject we venture to refer to the several facts communicated in our last section, *and proved by actual experiment.*

In viewing the eyes with reference to their contiguous structures, we may observe the arch of the orbit projecting over the eyes, the prominence of the cheek-bone below the eyes, and the bridge of the nose placed to the inner side of each eye. Now if this arrangement of the structures contiguous to the eyes be considered exclusively as forming a guard or shield for the visual organs, so perfect do we find the existing arrangement for meeting this necessity, that were the eyes thus placed solely with a view to their protection from external violence, nothing, it would appear consistent with the unimpaired function of the organs, could be more effective. If, however, we regard these structures from another point of observation, viewing them exclusively in their relation to the phenomena of vision, we cannot fail to discover that they are intimately connected with the perfection of the visual mechanism. And it will, we think, become evident, not merely that they discharge a very important office, but also that they fulfil their purpose with a precision and completeness which could not have been exceeded had the face been formed with no other view, than that of providing an appropriate framework or setting for the visual organs.

The field of vision has been usually described as being bounded or limited by the bones of the face, but this statement is far from being adequate.

The field of vision is bounded above, below, and to the inner side of each eye by the bones of the face; above by the brow, below by the cheek-bone, and to the inner side of each eye by the nose; but we remark, *and it is very important to remark,* that

on the outer sides of the eyes no external boundary exists; at this point the arch of the orbit meets the cheek-bone and leaves a hollow, which in this direction admits the visual rays to the full extent to which the eye is capable of receiving them; and if we connect this fact with the bulging forward of the transparent cornea, we cannot fail to recognise, an adaptation of means calculated to give, in the lateral direction, a great extension to the visual field; and this will become evident if the ends of two fingers be so applied as to close up the hollow which exists at this point, for in so doing we cut off about one half of the field of vision; and *let it be observed, that all rays entering the eyes in the direction we have indicated, fall exclusively upon the nasal halves of the retinae.* The fact then to which we allude may be thus stated, that the nasal field, or so much of the visual field as results from the two nasal halves of the retinae, is greatly extended in the lateral direction; and that this extension is due to the hollow which exists, at the junction of the cheek-bone with the arch of the orbit.

We may now turn to another fact connected with the bones of the face, viewed in their relation to the phenomena of vision; and we have to show that the nose from this point of view becomes a very important, though a passive organ in the function of vision, and acts as a septum placed intermediate between the two eyes. Now the effect of a septum placed intermediate between the eyes, is, *if it projects sufficiently forwards*, to cut off *all* images from the temporal halves of the retinae; while a septum so placed, however far it may project, offers *no obstruction* to the nasal halves of the retinae, but if the septum project forwards but a *short* distance, it will then only *partially* cut off the images. The nose forms just such a septum, partially cutting off the images from the *temporal halves of the retinae, and thus limiting the temporal field.* We are, therefore, by the above observations, put in possession of two leading facts, namely, the limitation of the temporal field, and the extension of the nasal field, and we remark that these two important conditions result from the position of the eyes in their relation to the bones of the face.

It may, therefore, be regarded as a fact deducible from the above observations, that the combined or common field of vision admits of three divisions, namely, a central and two

lateral; the central binocular and co-operative, the lateral monocular and separate. This being so, but little reflection is required to suggest the necessity for some such provision as that to which we have been alluding; for since the visual field when viewed with both eyes, consists of three divisions, the central region being binocular, the two lateral monocular and separate, we may readily imagine that confusion would result, were the limits of the single and double action of the two retinæ, uncertain or ill defined; and thus we are prepared to recognise a necessity for some provision to meet this requirement, and for such provision we may in vain seek *within* the eyes; but when we regard the eyes in their relation to adjacent structures, we find the required provision, in connection with the form and position of the nose; since this feature from being placed exactly intermediate between the two eyes, and having the required projection, discharges perfectly the office of a septum, and gives a sharp and definite limit to the co-operative action of the two eyes. Up to a given line, therefore (this line being determined by the position of the nose with reference to the temporal halves of the retinæ), the eyes are co-operative, vision is binocular, and the result apparently single; beyond this point vision is monocular, the field is *exclusively nasal*, and the two eyes, are, as separate organs; since the nasal tracts of the retinæ are *distinct*, alike in their visual direction, in their sensations, and also in their impressions,—the eye of the right side receiving its images exclusively from the right side of the field, and the eye of the left side receiving its images exclusively from the left side of the field.

We now propose to extend our inquiries by casting a glance *within the eyes*; and thus will our observations be directed to some of the phenomena, connected with the associate action of the two retinæ in the common field of vision.

Those there are who would explain these phenomena upon the hypothesis of habit and experience. It is observable, however, that these views are sometimes advanced, *not as the result of experiment*, but rather as matter of *opinion*,—although (as it would appear) these opinions are somewhat at variance, alike with the facts of anatomy, the laws of physiology, and the evidence of pathology; doubtless, however, *opinion*, when sanctioned by eminent philosophers, *although unsustained by*

experiment, may assume the weight of authority, still, with every desire to accord all deference to *opinions* thus sustained, we must confess to some difficulty, when we place beside these opinions, weighty though they be, a somewhat extended series of experiments which are consistently, and as we venture to believe, *conclusively*, opposed to this view of the subject: *for it rests we think upon irrefragable evidence, that so far as the eyes act in concert, the two right and the two left halves of the retina, each pair respectively, act together;—that these sections of the retina are identical both in direction, and also in colour sensation, that they are so from causes inherent in our nature, and that the result is essentially connected with structural arrangement.*

In the accompanying diagram corresponding halves of the retinae are placed one over the other; the nasal halves form the larger and external curve, the temporal halves the smaller and internal curve; the horizontal line A—A indicates the limits of the temporal field, the vertical line B—B divides the field into symmetrical halves, and passes through the centres of the yellow spots; the entrance of the optic nerves is shown at C—C; that of the right side is connected with the nasal half of the left retina, that of the left side with the nasal half of the right retina: for it must not be forgotten that the relative position of the *nasal halves of the retinae is reversed in the diagram*, the right nasal being placed in alliance with the left temporal, and the left nasal with the right temporal,—an arrangement, it will be observed, which agrees with the decussating fibres in the commissure of the optic nerve.

If now we direct our attention to the combined retinal field as depicted in the diagram, we cannot fail to observe, that it is divided into distinct sections: namely, a central, bounded on either side by the optic nerves; C—C two lateral, commencing from the outer side of the optic nerves and extending to the limit of the temporal field —A—A; and two remaining sections, represented one on either side, by a single line stretching from A to F. In referring to these several tracts we shall speak of them as *distinct regions*, namely, *the central, the lateral, and the nasal*; and this distinction is by no means arbitrary, since it can be shown that connected with each of these tracts or regions, is a corresponding modification of the visual phenomena.

The central region is *binocular*; over this region vision is

distinct ; the *lateral* are also *binocular*, but over these regions vision is *indistinct*. The *nasal* regions are *single*, or *monocular* ; here vision is increasingly indistinct, and towards the periphery the images fade off into mere shadows. We must next observe that where the optic nerve enters the eye, the retina is insusceptible to visual impression—the blind spot it has been called : in the diagram this space is indicated by a break or gap. The phenomena connected with the blind spot present difficulties by no means easy of solution, but to this part of the subject we shall hereafter have occasion more particularly to refer ; for the present we allude to the blind spots with reference *only* to their respective *positions* in the retinal field.

The optic nerve enters the eye to the inner or nasal side of the yellow spot ; and if we refer to the diagram, the result of this arrangement in the combined field will be obvious, namely, that the *brightest* and most important region of the visual field is *bounded* on either side by a blind spot.

We have now to direct our attention to the different sections of the retinal field ; with a view to testing their individual susceptibility to visual impression. The phenomena connected with the blind spot will next come under our notice, and subsequently we shall remark upon the construction of the retinal field, viewed in relation to the appearance of double images.

The means required for conducting our observations, with a view to ascertaining the comparative susceptibility of the different regions, are sufficiently simple. For our field, we have used a board the dimensions of which are seventeen, by thirteen inches. The length of the board represents the width of the field. The distant end, or that end towards which the eyes are to converge, is semi-circular, while the sides are somewhat flattened, so that the form of the entire field may be compared with that of the horse shoe ; at the end next to the observer, and midway between the two sides of the field, a notch is made for receiving the nose. The whole field, excepting the proximate end, is to be surrounded with a band of smooth soft wood, four inches in depth ; this band, which we may call the object board, is for the purpose of receiving the objects to be viewed, and the entire field should be painted black. The object board through its whole length is to be equally divided by a horizontal line ; this line is intended as a guide for the arrange-

ment of the objects, so that they may be placed exactly on the same plane with reference to the eyes. Having inserted a pin close to the object board, and in the direction of the median plane of the head, we next proceed to ascertain the exact locality of the blind spot for each eye ; this may be done by converging the eyes upon the pin, while a small ivory ball or other object is held, if for the *right* eye, a little to the *right* side of the median line, and while the eyes are kept steadily fixed upon the pin, the ball is to be gradually moved from the point of convergence, that is outwards and laterally, until the image of the ball vanishes : and it is to be observed, that if the movement of the ball be continued outwards *after* it has become invisible, *the eyes still being fixedly converged upon the pin* in the median plane of the head : the ball will at a given point again come into view ; and in this fact we have clear evidence that the ball has traversed that part of the external field, opposite to the blind spot of the right eye. The same course having been pursued with reference to the left side of the field, we place in the direction of the blind spot for each eye, a white disc, one inch in diameter, and having steadily converged the eyes upon the pin inserted in the direction of the median plane of the head, we close one eye, say the *right*, and if the above conditions have been secured, the disc situated in the direction of the blind spot of the *left* eye will vanish ; we now open the *right*, and close the *left* eye, when the disc in the direction of the blind spot of the *right* eye will vanish ; this being so, we may safely conclude that the locality of the blind spot of each eye has been accurately determined.

It is a condition essential to the following experiments, that the eyes should be kept steadily converged upon the pin, placed in the direction of the median plane of the head. The object selected for our purpose is a square of three eighths of an inch—the colour bright orange ; after every successive inspection the object is to be removed three-eighths of an inch in the lateral direction, that is, more distant from the point of convergence ; and this rule will apply, excepting under special circumstances, when any deviation will be noted.

We may now proceed with our observations, connecting with each observation its appropriate numeral.

Obs. 1. The square is placed near to, but rather to the right

or the left side of the point of convergence: viewed as above described, the square is seen with perfect clearness in reference both to form and colour.

Oss. 2. Both form and colour distinctly seen.

Oss. 3. Form and colour fairly discernible, although the corners of the square do not appear well defined. We note that at this point the form is first observed to lose the sharpness of its outline, while the colour remains perfectly distinct.

Oss. 4. The form can for a second or two be discerned, but the eyes soon get fatigued, while the image becomes unsteady, and it would perhaps be difficult with certainty, to determine the form.

Oss. 5. The form can in degree be still discerned, but not with distinctness, and the image is unsteady.

Oss. 6. Very slight difference perceptible.

Oss. 7. The visual image is unsteady and uncertain—neither form nor position can be determined—the colour is fairly distinct.

We now place the object one-eighth of an inch to the *inner* side of the region of the blind spot, next at the same distance from the *outer* side, and subsequently at the same distance, first above and then below the blind spot; so that in each of these observations, the object viewed is placed one eighth of an inch distant from the immediate region of the blind spot. Under these circumstances, the images or parts of them are seen for a short time, but they soon become uncertain, or ill-defined, and then disappear. *We note that when images fall proximate to, although not within the region of the blind spot, the perception of such images is uncertain, imperfect, and transient.*

Hitherto, excepting around the blind spot, we have between each two of our observations removed the object under view three eighths of an inch more distant from the point of convergence; between each two of the remaining observations we shall remove the object twice that space.

Oss. 8. Object placed three quarters of an inch to the outer side of the blind spot.

Form cannot be discerned—colour indistinct.

Oss. 9. Form scarcely discernible, colour fairly distinct, image steady.

Oss. 10. No idea of form, colour well perceived. We note

that perception of colour remains, when the form can no longer be discerned.

Obs. 11. The visual image appears as an ill-defined, diffused spot of colour, both form and size being lost.

Obs. 12. The visual image is for a short time apparent as a spot of diffused colour, but this imperfect image becomes soon pale, and fades out.

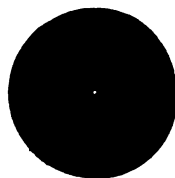
When the observations are extended to a part of the field so lateral that the object viewed is in a line agreeing with the plane of the two eyes, colour is still seen, but appears very diffused and is soon altogether lost.

It would, from the foregoing observations, appear that few propositions can be more clearly demonstrable; than that the retinal field is divided into distinct regions, and that agreeing with these separate regions, are corresponding modifications of vision. We further remark that the central and brightest section of the common field of vision, is bounded on either side by a spot insusceptible to light impression; and although the existence of a blind spot upon the retina, might at first sight appear somewhat perplexing; yet when viewed in connection with the facts now before us, we may, through the whole arrangement, discern a perfect harmony of design. The picture is to fade off from the centre to the periphery, the purpose doubtless being to give force to the central part of the field; and what so calculated to give brightness to the centre of the picture, as the comparative dulness of the lateral images? Another fact which is made apparent by the above experiments, and one not unworthy of notice, is that the perception of *form* is lost at a point much nearer to the centre of vision than that of colour. This is first noticed in our third observation; the object then under view being placed about three quarters of an inch distant from the point of convergence; it is there, we note that the sharpness of outline begins to be lost, and we observe the corners of the square appear ill defined, while the *colour* of the object remains perfectly distinct, and subsequently the visual image is described as a diffused spot of colour, both form and size being lost. So far, then, as the above experiments will justify any conclusion, it becomes evident that the persistence of colour impression, is far greater than that connected with form. In concluding these remarks, however, it

should be stated, that the above results are not given with the idea of furnishing any fixed rule with reference to the phenomena to which they relate : since the requisite observations are of a very delicate nature, and the results obtained may possibly be to some extent individual. We should further state, that when the images are noted as indistinct, or as mere shadows, we do not from these appearances conclude that the part of the field to which they refer, is under all circumstances insusceptible to clearer impressions ; for example, when the image is described as being scarcely visible, it should be borne in mind that the appearance noted, has reference to the precise conditions of the experiment ; and also, that our remarks have strict reference to a *gradation of results obtained under similar conditions* ; so, that were a luminous body or any object specially illuminated, presented to the same part of the field, the retinal image would probably be clearer ; still, this does not in any degree affect the value of these observations, since they have been instituted for the purpose of testing the several regions of the retinæ, *not* with reference to intensity of impression, but with a view to gauging their *comparative susceptibility* to impression, as relates both to form and also to colour, when submitted to these impressions under uniform conditions.

Having already referred to the blind spots upon the retinæ, we may now draw attention to some of the phenomena connected with these regions. The existence of these voids upon the retinæ is sufficiently proved by the fact, that if an object within certain dimensions be presented to either eye, so that its image falls upon the optic disc, usually called the blind spot ; such object is invisible ; and if in like manner *two* objects be placed one in the direction of the blind spot of each eye, *both eyes being open*, the two objects so placed will be distinctly seen, and seen in their true position, but if the *right* eye be closed, the object of the *left* side will vanish ; and if the *left* eye be closed, the object of the *right* side will vanish, proving that the right eye is blind to the object of the right side, and that the left eye is blind to the object of the left side, and *also showing that the image lost to the one eye is seen by the opposite eye*. If the reader holding the next page under view, about fourteen inches from the face, will close the left eye while the right eye is fixed upon the smaller spot, and then *gradually* draw the

book nearer to the face, when brought within about seven inches of the eyes, the larger spot will vanish.



Having thus assured ourselves of the existence of the blind spot; to state its dimensions, define its boundaries, and describe its form, might, to the uninitiated, appear to be a task of little difficulty—such, however, is far from being the case. In truth, the phenomena connected with this region are not merely exceptional, but they are also peculiarly difficult of analysis, and those who have most closely observed, will be amongst those most ready to admit, that when treating of these phenomena we are, to a great extent, *compelled* to note our observations in negatives.

Aubert, who is admitted to be one of the most practised observers in indirect vision, remarks that,¹ “although much accustomed to indirect vision, and after having repeated the experiments by Weber, Volkmann, and recently by Wittich, many times, I must admit that I have never succeeded in forming any opinion on the way in which the visual field is completed in this portion. In spite of numerous attempts I am not able to say if a cross consisting of a yellow and blue line presents one or the other colour at its intersection, when the intersection corresponds with the blind spot. I do not know either whether two parallel lines come nearer to each other or not, or whether a thick outline circumference appears perfect or not.”

¹ ‘Physiologie der Netzhaut,’ Breslau, 1865, pp. 257-258.

Without doubt, however, there exists upon each retina a blind spot, and that this blank upon the retina is equivalent to a very considerable space in the external field can be proved by experiment; for example, we have seen that a disc seven-eighths of an inch in diameter is lost to vision at seven inches from the eyes, and a disc of one foot in diameter is lost at from sixteen to eighteen feet from the eyes; few probably, therefore, would be prepared to anticipate that a blank so considerable could exist upon the retina without being very obstructive to the harmony of vision. That such, however, is not the result individual experience will abundantly testify, since it is only by *experiment* that we can assure ourselves of its existence, for we may in vain strive to detect in the external field a lost space agreeing with the blind spot upon the retina. Yet, while admitting our difficulty, we have still thought that some additional light might possibly be obtained by further experiment. If we present to the eye, in the direction of the blind spot, a disc too large to admit of its being wholly lost to vision, the central part of the disc is invisible, while portions of the periphery come into view; the portions seen do not, however, appear as distinct parts of a circle, but they are seen with much uncertainty, and only as fragments, now disappearing, then again coming into view. If, in like manner, we present to the eye a circle about two and a half inches in diameter, covered with small distinct spots, it might be imagined that so many of the small distinct spots as fall within the area of the optic disc would be invisible, and that the visual image would present a tolerably clear indication of the form and size of the blind spot. But the result is extremely confused; when viewed, the figure appears smaller than the reality, irregular, and somewhat out of place, but we are unable to discern any distinct blank or lost space agreeing with the blind spot; on the contrary, the entire surface appears to be covered with black irregular markings, and without leaving any actual void. We next submit to observation a disc one inch in diameter, surrounded by a number of small distinct spots; the result obtained is that the disc is invisible, while the distinct spots placed around it appear to be in motion, and the apparent motion of the surrounding images arises from their vanishing and then reappearing. And here let it be remembered that in our previous observations it has been noted that near to the blind

spot, whether above, below, or on either side, the images are observed to be unsteady, and that they occasionally vanish; this agrees with the vanishing and reappearing of the distinct images in the above experiment; *and these, with other analogous facts, have led us to the conclusion, that the blind spot has no defined limit, but rather that it consists of a central space, which is quite blind, and that this central space is surrounded by an areola, which is only feebly susceptible to visual impression.* Now, if our conclusion be correct, that the blind spot is surrounded by an areola which is but feebly susceptible to visual impression (and in our own case it is certainly so), we could not under these circumstances expect to define with precision either its form or its extent, and this, we think, is one step gained in our inquiry. Still the question remains, how comes it to pass that having a blind spot upon the retina we fail, excepting under experimental observation, to detect any corresponding blank in the external field? And various are the suggestions which have been offered in explanation of this apparent anomaly; such, for example, as that we do not observe a blank in the external field because the space lost to one eye is covered by the opposite eye. It has also been urged that the rapid movements of the eyes constantly displace the blank, so that the lost space in the external field remains unobserved. Again, it has been suggested that the obliquity of vision in the direction of the blind spot may prevent the vacuum from being noticed. These statements, all of them, are to some extent true, but as a solution of the problem under notice they signally fail, and that they do so is, we think, sufficiently apparent. The vacuum occasioned by the blind spot of one eye is undoubtedly covered by the opposite eye; in other words, an image of the object lost to the nasal side of the right eye falls upon the temporal half of the left eye, and the converse; in this way, therefore (*both eyes being open*), the continuity of the picture is doubtless explained. *But the problem to be solved belongs, not to binocular, but to monocular vision*, and that it does so is proved by the fact that if one eye be closed while the other eye is directed to any uniform surface, such, for example, as a piece of ground glass held opposite to the light, we fail to discover any shadow or other indication of the blank which is known to exist upon the retina. Evidently, therefore, the

vicarious action of the two eyes fails, if viewed as a solution of the phenomenon we now refer to. Neither, in this view, can we attach much importance to the constant and rapid motion of the eyes, for here we are met by the fact that, when we know the precise direction of the blind spot, and search for a corresponding blank in the external field with the eye fixed, and under the most favorable circumstances, we are still unable to detect any vacuum. But there remains yet another solution, and one which requires our notice; it has been thought that the *obliquity* of vision in the direction of the blind spot prevents us from detecting a corresponding blank in the external field. Now, with reference to this suggestion, we need only remark that, if an object be placed so that its image is referred to the blind spot, this object will be invisible; but if it be removed to a point more distant from the median line, that is, in a direction *more oblique* as it regards vision, the object again becomes distinctly visible. Clearly, then, it cannot be the obliquity of the visual direction of the blind spot which prevents us from observing any corresponding vacuum in the external field.

There still remains, then (and, as it appears to us, wholly unexplained), the remarkable fact that with a blind spot upon the retina we cannot, in ordinary vision, detect a corresponding blank in the visual field; and the problem for solution is this—under what circumstances, or by what means, is the blank in the external field so veiled as to become imperceptible in ordinary vision?

If we present to the blind spot a white disc upon a black background, the disc falling upon the blind spot is invisible, while the black background is apparently continuous *over the space really occupied* by the white disc; but this, it might possibly be urged (if we suppose blindness to be analogous to blackness), is a result which might be anticipated, because under this view the blindness of the spot upon the retina would correspond with the blackness of the surrounding background of the external image. But if we reverse the conditions of the experiment, by placing a *black* disc upon a *white* background, the disc, as in the former experiment, is lost to vision, but we find that the background of *white* is apparently continuous over the space really covered by the black disc; if, then, the former result could be explained by comparing blackness with blind-

ness, the latter result cannot be accounted for in the same manner. In both experiments the space really lost to vision is apparently covered over by the background colouring, if so we may speak; the background in the former experiment being *black*, in the latter *white*.

That the phenomena connected with the blind spot are exceptional and somewhat perplexing, and that the various suggestions to which we have referred, if viewed as a solution of these phenomena, are inadequate, cannot, we think, be denied. There still, however, remains yet another solution, to which we have not yet referred; it is that which was advanced by Volkmann, namely, that the blank in the external field agreeing with the blind spot upon the retina *is covered by an act of the imagination*; and Helmholtz, who adopts the same view with Volkmann, gives as one of "the prettiest examples" advanced by Volkmann, that if a printed sheet of paper be submitted to the blind spot we see, or apparently see, the space answering to the blind spot filled in with letters. Accepting this as a good illustration of the evidence on which the theory of Volkmann rests, we propose to submit the question to a somewhat closer examination.

When we present to the blind spot a white disc upon a black background the white disc is lost, but the background is apparently continuous; and when, in like manner, we present a surface covered with small distinct spots, the surface so covered is apparently continuous *over the space answering to the blind spot*. Now, Volkmann's experiment with the printed paper is, as it appears to us, exactly on a par with these experiments; for what is the result obtained by viewing the printed page of Volkmann? It is simply a *generalised idea* of the background covering, the effect being just such as we obtain by looking at a printed page with the eyes nearly closed, or from a distance too great to admit of distinct vision. We recognise it as a printed page, but without any idea of the individual characters. In the experiment of Volkmann, therefore, we perceive neither more nor less than an *apparent* continuation of the background covering; the letters appear, *not as letters, but as irregular markings* arranged in parallel lines upon a white surface; and the conclusion at which we arrive is, that the experiment of Volkmann perfectly coincides with, but is neither more nor less than, our other expe-

riments ; and it would, we think, be consistent to infer that any solution of either of these results would be an adequate solution of the rest. *And the impression still remains that the problem before us has yet to find its solution.* Helmholtz, we have said, agrees with Volkmann in believing that the blank in the visual field is covered by an act of the imagination, and he illustrates this view by supposing it to be analogous to a person who is viewing a picture with a hole in it, and who endeavours to imagine what the picture is intended to represent ; the observer (agreeably with this view) immediately fills up the vacuum with the colour of the background, and this without any distinct idea of the picture presenting any difference at this point. The illustration here employed is not, we think (if Professor Helmholtz will excuse us), very perfect, and we would submit that it is one thing not to *observe* the hole in the picture, quite another to *restore* the *blemish*. And the blind spot upon the retina Helmholtz compares to "the vacuum which the visual field presents behind our backs." It may, he says, be affirmed that in the void of the visual field (that is, in the space corresponding with the blind spot) visual sensation is wanting; neither light, colour, nor obscurity is perceptible; nothing; in the rigorous acceptation of the word, is seen, and it is, he adds, quite the same with the larger vacuum which the visual field presents behind our back. Its existence is better known than that of the blind spot, because we have never had the sensation of filling up, while the void of the blind spot is ordinarily filled up sufficiently by the perceptions of the other eye and by the displacements of vision, so that it is not seen as empty. Every suggestion coming from Professor Helmholtz demands our most careful consideration ; still there are, we think, several facts which appear somewhat adverse to his conclusions with reference to the close analogy he supposes to exist between the blank occasioned by the blind spot upon the retina and the so-called vacuum behind our backs ; and these facts, as it seems to us, should be taken into the account, for, if we mistake not, there is an important difference between the two phenomena. The blind spot consists of a portion of the retinal field which is positively dead to objective impression, *and this blind space upon the retina is found in close contiguity with the brightest part of the visual field.* It is, then, as relates to the

blind spot upon the retina, a total absence of light in the midst of the brightest light.¹ Now, with reference to the so-called vacuum behind the back, we remark that there is no sudden change from light to darkness; on the contrary, from the centre to the periphery the retinal field becomes less susceptible to visual impression, and so gradual is the change, that it is impossible to detect a marked difference at any one point; the transition from bright images to mere shadows is imperceptible. It may be described as a gradual fading out, a passage from noonday to twilight, and from twilight to nothingness, while the blind spot upon the retina is surrounded in all directions by clear bright light. Neither must we, in discussing this point, lose sight of a provision already alluded to, *and designed, as it would seem, to prevent any vacuum behind the back.* We refer to the deep furrow formed by the junction of the cheek-bone with the arch of the orbit on the temporal side of each eye; and we have in the early part of the present section pointed to the fact *that in this direction only* it is that light is admitted to the retina free from all external impediment. In every other direction the visual field is limited by the bones of the face, and in this exceptional adjustment of the parts contiguous to the eyes, viewed in connection with the projecting forwards of the transparent cornea, there exists a provision, as it would seem, specially designed to prevent any sudden limitation of the field in the lateral direction. And so perfectly do these arrangements fulfil the purpose indicated, that when the eyes are *directed immediately forwards* we obtain vision of objects somewhat to the rear of our body, and by turning the head we can obtain vision of the entire external field; so that if we stand with our back against a table, a lighted candle being placed upon the table and opposite to the spine, on turning the head over the right shoulder the candle is seen by the right eye, and on turning the head over the left shoulder the candle is seen by the left eye. We fail, therefore, to trace any analogy between the vacuum occasioned by the blind spots upon the retinæ and the so-called vacuum behind our back.

But let us now examine the question before us with reference

¹ We forbear to state that the absence of sensation in the retina is equivalent to darkness, but we think that this point admits of clearer illustration than as yet it has received.

to the opinion expressed by Volkmann and Helmholtz, namely, that the blank in the external field "is covered by an act of the imagination." What are the facts before us? That if an object of given dimensions be placed in the direction of the blind spot, that object is invisible, while the space really occupied by the object so presented is, or appears to be, covered by a continuation of the background colouring. There are, it is obvious, two distinct phenomena connected with this result. An object presented to the eye in the direction of the blind spot is lost to vision; this is the first step. While we lose the image presented to the eye, we perceive a continuation of the background colouring extending over the space really covered by the object, the object being invisible; this is the second step. With reference to the first step, we will only observe *that in the loss of the image we recognise a phenomenon which is perfectly consistent with a fixed law.* The nerves, where they enter the eye to form the optic disc or blind spot, *exist as trunk-fibres.* Now, it is well known that the nerve-fibres are not susceptible to visual impression until they reach the periphery; and were it otherwise *our vision would be disturbed by a tract of light in the direction of every trunk-fibre.* We pass now to the second point for inquiry, namely, that over the space agreeing with the blind spot, while we lose the image of the object presented to the eye, we perceive a continuation of the background colouring; and here lies the difficulty of the question before us, a difficulty which will no longer exist if only we fall back upon psychical agency; but we doubt not that all the phenomena of vision will prove to be obedient to one common law; *and we think that it is the office of the mind to perceive and to interpret rather than to overrule.* Conscious, then, of the difficulty of the question before us, we inquire, is there no recognised fact in relation to vision with which the phenomena before us would appear to connect themselves? And we think that there is—namely, the spreading of impression upon the retina, a quality of the retinal impression which was distinctly noted by Müller, and has been extensively illustrated by more recent observations (see our earlier papers in these Reports).

We will now proceed to describe the steps we have taken in attempting a further illustration of this part of the subject. Having prepared a card, the surface of which is painted one

half yellow, the other half blue, a perforation of one inch in diameter is made in the centre of the card. Under these circumstances the space lost from the card by the perforation will, it is obvious, be taken, one half from the yellow, the other half from the blue. If a card thus prepared be presented to the eye at a distance of about eleven inches, so that the image of the perforation falls upon the blind spot, the result will be that the perforation is lost. Up to this point the result is analogous to that obtained from the experiments with discs, *supplemented, however, by the following important fact*. Not only does the surface of the card in this experiment appear unbroken, but the yellow of the one half and the blue of the other half meet and form a continuous line, apparently stretching across the perforation and extending from side to side; in short, the visual result is the same as though there were no opening through the card, *the two colours* being apparently continuous over the entire surface. Let it be observed that, under the circumstances here described, we have not merely a veiling over the space lost in the card, but we have also extending over the region of the blind spot a *distinct visual impression of two different colours*, namely, blue and yellow. And this phenomenon appears somewhat at variance with the opinion of Helmholtz, namely, that it may be affirmed that in the region of the blind spot visual sensation is wanting; neither light, colour, nor obscurity is perceptible. And since it is perfectly clear that the retinal stimuli agreeing with blue and yellow cannot, under the circumstances described, be transmitted from without, it follows that the impression in this instance must be subjective, and thus are we led to the point already anticipated, namely, the spreading of impression upon the retina. And we will now proceed to describe two additional experiments, which bear, we think, with some force upon the question under notice.

It will be understood that in the two following experiments the eyes are separated by means of a septum extending from the middle of the forehead to the objects viewed, thus rendering it impossible that the image presented to one eye should be seen by the opposite eye; we should also state that in the view here taken black will be regarded as a colour. In the first experiment we simultaneously present to the left eye a disc of black and to the right eye a square of red; when

viewed, the disc of black is referred to the yellow spot of the left eye, and the square of red to the yellow spot of the right eye. The visual result is a disc of black superimposed upon a square of red, the colour of the square being red mingled with black; while the two distinct forms, namely, that of the square of the right eye and the disc of the left eye, are perfectly preserved (see result, Exp. 1). We note that in this experiment the colour of the disc, which is seen exclusively with the left eye, is transfused through the entire image of the square, which is seen exclusively with the right eye. In our second experiment, we simultaneously present to the right eye a disc of red, and to the left eye a circle of black, the inner margin of the circle agreeing with the circumference of the disc (see Exp. 2). The visual result is a circle of black filled in with a very faint tint of red; and if the circle be increased in force, in other words, if it be made broader in outline or of more intense blackness, the red of the disc will, under these circumstances, *be entirely lost* (see result).

In the first experiment we prove that the colour of an image presented exclusively to one retina may be diffused through an image differing in form, considerably more extended in magnitude, and received exclusively upon the opposite retina; and we also remark that the fusion of the two colours is limited and sharply defined by the extent and form of the larger image.

In our second experiment we have the colour of an image presented exclusively to the right eye, wholly or partially abstracted by an image of a different colour simultaneously presented to the left eye, the images in this experiment falling, *not upon corresponding, but upon proximate* points of the two retinæ. In the first experiment we have a spreading of the black into the red, in the second a passage of the red into the black; and it is to be observed that the colours employed in these two experiments are identical, and that the modification consists only in the relation in which the different colours are placed to each other; hence it would appear that the phenomena connected with the fusion of different colours simultaneously presented to the two retinæ are subject to definite laws.

The results referred to are very suggestive, and their interest is by no means limited to the question immediately under notice; they bear, however, we think, with peculiar force upon the phenomena connected with the blind spot, and to this

phase of the subject our attention must for the present be restricted. That the phenomena of the blind spot and the results obtained from the above experiments are not exactly parallel we readily admit. It is, however, to be considered that, from the circumstance of the blind spot being dead to objective impression, we are precluded from any direct experiment upon the part we should most desire to submit to experimental investigation; it would, therefore, from the very exceptional nature of the subject, be, perhaps, impossible to institute any exact comparison. Still, as from a reflected light we may sometimes obtain a better view, so by *analogous* observations we may hope to arrive at a clearer judgment; and we remark that the covering over the void occasioned by the blind spot results in every instance from an extension of the background colouring, *so that the phenomenon for which we seek a solution evidently resolves itself into an extension of colour excitement over a part of the retina not submitted to objective impression.* Now, by the foregoing experiments we distinctly prove that this phenomenon *does, under the conditions of these experiments, actually occur.* But here we are met by a new difficulty. Admitting that colour impression may traverse the retina, and extend to parts not primarily impressed, how, it may be asked, can this fact elucidate the phenomenon under notice, seeing that the true retina does not exist over the region of the blind spot, but commences at its margin? Still, our resources are not, we think, yet exhausted. The retina consists of several distinct layers, which differ materially in their structure as also in the arrangement of their respective elements; and although the precise function of the individual layers has not hitherto been determined, we may, perhaps, with safety conclude that each layer is endowed with its own special office, and that they are all essential to the perfection of vision. If now we turn to the anatomy of the blind spot, as given by a living and distinguished author, we shall find it thus described:

"The first part of the retina to be described is the *fibrous gray layer*, which forms the immediate continuation of the optic nerve, and which is seated on its inner surface. This is a layer of fibrous character, radiating from the end of the optic nerve, and apparently consisting of the tubular fibres of that nerve deprived of their white substance, that is, being no longer

tubular and white, but solid and gray, and united together more or less into a membrane. . . . It is to be remarked that the fibrous gray layer is the only nervous element of the retina existing over the extremity of the optic nerve, where it enters the globe—a spot incapable of vision. Immediately around this spot the other layers commence. . . . It will be remembered that the fibrous lamina of the gray nervous layer of the retina is here evolving itself from the nerve, and is *not yet invested with the vesicular or other laminae*, a circumstance of great interest in regard to the *modus operandi* of the constituents of the retina in vision.”—‘Physiological Anatomy,’ by Todd and Bowman, vol. ii, London, 1859, pp. 28, 29, 54.

It would, then, appear that spreading over the optic disc or blind spot we have the nervous gray layer of the retina, and that this is the only layer of the retina present at that part; we find it described as of a fibrous character, and being united together more or less into a membrane. Haller,¹ who wrote in the year 1757, asserts that at the entrance of the optic nerve there is no true retina, but a white membrane, ‘cellular and porous. We must now for a moment fall back upon the results which were obtained from our experiments relating to the effects of different colours simultaneously referred to the two retinae, as communicated in two previous sections.² In these experiments it was clearly proved *that colour sensation is connected with a separate and distinct force*, and so distinct is this force that, when brought into dominant action, it was found to neutralize those laws which are connected with direction or form. If, then, we are right in concluding that each layer of the retina has its own special office, and that colour sensation is connected with a distinct force, *we would next remark that in the region of the blind spot we have but one layer, the nervous gray layer, and this region we have proved to be susceptible of colour impression. Thus viewed, the facts now before us would appear to connect the gray nervous layer of the retina with colour sensation, and it would, we think, be consistent with these facts that the region of the blind spot should receive its colour impression from the surrounding parts.*

The remaining point from which we have proposed to view

¹ ‘Elementa Physiologiæ,’ vol. v, p. 474.

² See ‘Guy’s Hospital Reports,’ vol. x, third series, p. 225.

the retinal field is that of its relation to the appearance of double images, and we note that, while the uninitiated are but slightly conscious of these phenomena, philosophers continue to give to this part of the subject a prominence which, as it appears to us, far exceeds its importance.

Double images are subject to precisely the same laws as those which determine the phenomena of single vision, and these laws are as rigidly fixed as any physical laws can be. The retina is studded over with light-receiving points, and so many distinct cones of light as can be made to fall upon separate points of the retina, so many images will there be of the object from which those distinct cones of light are transmitted; *and we further state that each light-receiving point upon the retina has its own individual direction, and is capable of receiving and transmitting to the brain its own separate and individual image.* It is also to be remarked that corresponding points of the retina are identical in their direction; it follows, therefore, that images falling upon corresponding parts of the retina must be referred to the same place in the external field. Under these circumstances superposition of the two images occurs, and they are seen as one—hence the apparent singleness of result from corresponding points of the retina. On the other hand, double pictures appear when the images are referred to non-corresponding points of the retina, *and they do so because non-corresponding points of the retina have different directions, that is, they refer their images to different places in the external field; consequently, images falling upon non-corresponding points of the retina are seen as two.* It follows, therefore, that, subject to the conditions of ordinary vision, double images can occur only when the two eyes receive their respective images from the same objects in the external field. And in directing our attention to the phenomena connected with double images, *we shall observe which portions of the field are exempt from them; where they may occur without being obtrusive; and finally, we shall inquire in which section of the field, and under what circumstances, double images may become both numerous and very disturbing to the function of vision.* By referring to the diagram we may observe, on either side, a space marked by single lines; these single lines indicate the absence functionally of the temporal halves of the retina; hence it is apparent that the space

extending from A to F is single. Over these regions of the field, therefore, vision is single, and double images cannot occur; neither must we fail, when computing the extent of the single portions of the combined fields, to include the lost space occasioned by the blind spots.

We pass now to the consideration of those regions where double images may possibly occur, but where they cannot disturb the visual function; the sections referred to we have designated the lateral; they commence, each respectively, from the outer margin of the blind spot, and extend to the extreme limit of the temporal field (A). Images falling upon these tracts of the retinae are at best indistinct, and being referred laterally, and distant from the centre of vision, *we remark that it is impossible they should disturb or perplex the visual perception.* Up to this point, therefore, the question of double images assumes but very slight importance, excepting only as an interesting phenomenon of binocular vision. We have yet, however, to give our attention *to the central portion of the field, and it is in this, the most important, and the brightest section of the field, that double images (if we judge from experimental observations) are the most abundant and the most conflicting.* And is there, we would inquire, nothing in this circumstance calculated to arrest our attention? Nothing inconsistent in the idea, that in that portion of the field where vision should be and certainly is most perfect, that there it is subject to the greatest obstruction? The fact, then, to which we would now direct attention, and we consider it very suggestive, is *that, although in experimental observations, as they have been and continue to be conducted, double images do, in the central part of the field, unquestionably abound, yet that in ordinary vision we are, excepting under peculiar and seldom recurring circumstances, wholly unconscious of their existence.*

We may now, perhaps, with some advantage leave the retinal field while for the moment we direct our attention to the external field; and if, guided by the light of experiments, as they have usually been conducted, we inquire which section of the external field is observed to be most prolific of double images, we shall find it to be that section *included within the visual lines and immediately before the eyes*, or, to speak more accurately, that space bounded on either side by a line drawn

from the centre of each pupil to the point on which the eyes converge ; or, if the optic axes be parallel, it is that section of the field agreeing with the distance between the centres of the two pupils, and extending into space. We desire, however, to make our statement upon this point still more explicit ; and be it observed, we do not state that in *natural vision* double images abound within the space to which we have been referring ; our statement is, that in *natural vision* we are little conscious of double images, and this only under exceptional conditions, while in *experimental observations, as usually conducted*, they are found to be numerous, *and most specially so*, in that portion of the field where vision should be, and certainly is, the most perfect. This being so, we cannot avoid referring to experiments, as they are frequently conducted, and our observations upon this subject might, we think, admit of rather extensive illustration. But this is not the point immediately before us ; still, in passing we venture to assert *that, if experiments relating to binocular vision be conducted without recognition of the exceptional properties of the space included within the visual lines, such experiments, when relied upon as exponents of the phenomena to be observed in the visual field generally, must lead to erroneous conclusions.* And yet the space indicated has been constantly selected as *the* region for experimental observation ; and this too without recognition, or rather, as it would appear, without knowledge, of its special qualities. Thus has it come to pass *that abnormal phenomena, or phenomena obtained from exceptional conditions, have formed a base for new speculations, the tendency of which has been to surround with fictitious difficulties the subject they have been supposed to elucidate.*¹

We need not here dwell at length upon the conditions of stereoscopic vision, as contrasted with those of natural vision, this part of the subject having received our attention in previous sections ; but we may avail ourselves of the stereoscope in illustration of the foregoing observations, *this instrument being a great example of the inadvertence* to which we have been alluding ; for it is by placing one half of each picture *within the visual lines* that the stereoscopic result is obtained ; and we assert that no object so placed can be seen single and in its true position, a result which, in the use of the stereoscope, is

¹ 'Guy's Hospital Reports,' third series, vol. xii.

only partially avoided by the introduction of a septum between the two eyes.

It is not, however, the *phenomena* of the stereoscope we have now to consider, but rather *the theory of visible direction which has been connected with the stereoscope*; and we may premise our remarks by stating, that the stereoscope inaugurated by Sir Charles Wheatstone in 1838 is a reflecting stereoscope. This instrument consists of two plane mirrors, adjusted in such a manner that their backs form a right angle with each other, whilst the salient angle formed by their junction projects towards the nose of the observer, whose eyes, directed towards the right and left mirrors respectively, receive the images of the two pictures. The lenticular stereoscope, that introduced by a late eminent philosopher, is a refracting stereoscope. Up to this point, however, our observations will apply equally to both, for, whether the instrument be constructed upon the principle of reflection or of refraction is, so far as relates to the question before us, of no importance; but the lenticular stereoscope introduced subsequently to that of Sir Charles Wheatstone was generally accepted as an improvement, and so far as it is smaller, more convenient, and therefore better adapted to ordinary purposes, it is an improvement; but how far its claims to excellence will endure, when viewed with reference to natural vision, is, we think, a separate question. The great advantage to be gained by means of this instrument was by the author supposed to be obtained from the introduction of the lenses; *and it is to the particular form of these lenses, the reason assigned for their introduction, and to the theory of visible direction propounded in connection with the lenticular stereoscope, that we now direct our attention.* The lenses employed are semi-lenses, having their edges placed inwards—in short, *they are prisms*, and have the effect of displacing the retinal image, that of the right eye a little to the left, that of the left eye a little to the right, thus assisting in bringing the two pictures together, or rather in placing the one picture over the other, the idea being to assist the process of convergence. We may now turn our attention to the theory of visible direction connected with the lenticular stereoscope, and we will give it in the words of the author (the italics are our own):—“*So quickly does the point of convergence pass backwards and forwards over the whole object*

that it appears single, though in reality only one point of it can be seen single at the same instant. . . .

"When we look at a living man, a statue, or a landscape, the optic axes are converged in rapid succession upon the nose, the eyes, and the ears, or upon objects in the foreground, the middle, and the remote distances in the landscape, and the relative distances of all these points from the eyes are instantly perceived. . . . Although it is by the combination of the two plane pictures of an object, as seen by each eye, that we see the object in relief. *Yet the relief is not obtained from the mere combination or superposition of the two dissimilar pictures; the superposition is effected by turning each eye upon the object, but the relief is given by the play of the optic axes in uniting in rapid succession similar points of the two pictures and placing them for the moment at the distance from the observer of the point to which the optic axes converge.*"¹ The theory here enunciated may be thus summarised. The two stereoscopic pictures being placed in a given relation to the eyes, corresponding images are, by the deflection of the rays of light in their passage through the two prisms, referred to corresponding parts of the retinæ; superposition of the two pictures is the immediate effect, but this is only the first step, it is not the visual result; *superposition of the retinal images only places two flat pictures one over the other, it gives no idea of projection, and the binocular effect is obtained by the play of the optic axes, in uniting in rapid succession similar points of the two pictures, and placing them for the moment at the distance from the observer of the point on which the optic axes converge.*

According to this theory the resultant image is really never formed at all, but is supposed to be represented to the mind by a succession of rapidly vanishing points; for it is an essential part of this theory, that every point in the field, excepting the one point on which for the moment the eyes are converged, appears double and indistinct. It should be here remarked, however, that while it is perfectly consistent with the theory under notice that all points excepting the one point on which the eyes are converged should be seen double, it is gratuitous to conclude that these double images must be indistinct, and by a parity of reasoning that, therefore, they do not perplex the

¹ Sir David Brewster 'On the Stereoscope,' pp. 50, 51, 53.

mind; *on the contrary, it might, we venture to think, be proved by experiment that such cannot be the case; images are distinct or otherwise, according to the part of the retina to which they are referred*, and under the circumstances described double images must occur in the central region of the field, some of them very near to the axis of vision, and in this part of the field they will, though not binocular, *be distinct*, as distinct as in vision with one eye, so that under the circumstances described the visual perception must be indeed acute, to distinguish the point on which the eyes are for the moment converged from the surrounding double images.

But let us observe the leading propositions included in this theory.

First. That convergence of the eyes is essential to the superposition of the retinal pictures.

Second. That the two retinal pictures are referred to the point where the optic axes meet.

Third. That we obtain single vision of one point only at the same time, namely, that point on which for the moment the eyes are converged, all other points appearing double:

We will now place these propositions in juxtaposition with several facts which have been obtained from more recent investigations,¹ and we venture to state that the observations on which we base our conclusions are of no uncertain kind; on the contrary, the experiments on which they rest are of a very simple character, and the results obtained such as can be discerned by the most unpractised eye. *The facts, then, of which we are about to speak have been proved by experiment, and can be demonstrated to the conviction of any intelligent mind. It is right, however, we should first state that, although the theory to which we have been alluding might in some respects be regarded by Sir Charles Wheatstone and others as untenable, yet in its fundamental points, and certainly so far as relates to those included in the first two propositions, this theory is in perfect accordance with authorised and received opinion.* The statement included in the first proposition is that convergence of the eyes is essential to the superposition of the retinal pictures. This point it may be supposed was considered as being too self-evident to require investigation; still, however, the conclusion

¹ See 'Guy's Hospital Reports,' "Stereoscopic Results," sect. vi.

arrived at will, if submitted to the test of experiment, prove to be erroneous, for if two pictures be placed in the same relation to the eyes as when seen in the stereoscope, *and viewed with the optic axes parallel, and without lenses*, the retinal images will under these conditions be superimposed and appear as one, *and with the same facility as when viewed in the stereoscope with the eyes converged and with the addition of the lenses.*

We pass now to the statement included in the second proposition, *namely, that the retinal images are referred to the point where the optic axes meet.* This statement doubtless might also have been considered as too thoroughly established to require investigation; but again we must remark that if submitted to the test of actual experiment the conclusion arrived at will prove to be erroneous: the truth being, that if two objects be viewed *in the direction of the visual lines*, and nearer to the eyes than the point of convergence, the visual images of objects so viewed will be superimposed *in the direction of the median plane of the head*, and at a distance from the eyes, *agreeing with the distance of the objects viewed.*

And it is to be further observed that a precisely similar result is found to accrue, whether the objects be viewed *with the eyes converged or with the optic axes parallel*; in either case the images of objects viewed in the direction of the visual lines will be superimposed and seen *in the direction of the median plane of the head*, and on a *plane even with the objects viewed.*¹

We abstain from further discussion upon the third proposition, since, it being contained in the first and second, these failing, *it too* must fall to the ground.

Such are the propositions included in a theory sanctioned by the high authority of a late eminent philosopher; but if the statements above made can be sustained by facts, and if, as we assert, these facts are susceptible of clear demonstration, they do not merely disturb, but they annul, the theory of vision, as it has been and still is propounded. And although doubtless there are those who will continue to raise new superstructures upon a base prepared by authority; yet for such as venture to quit the smooth and even path of authorised opinion, there remains a question, and it is *the* question for those who search after truth—Would the eminent philosopher to whom we

¹ 'Guy's Hospital Reports,' vol. ii, third series, p. 225.

are indebted for the lenticular stereoscope, had he been cognizant of the above facts, have advanced this theory or maintained these views?

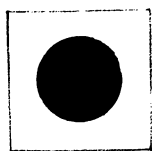
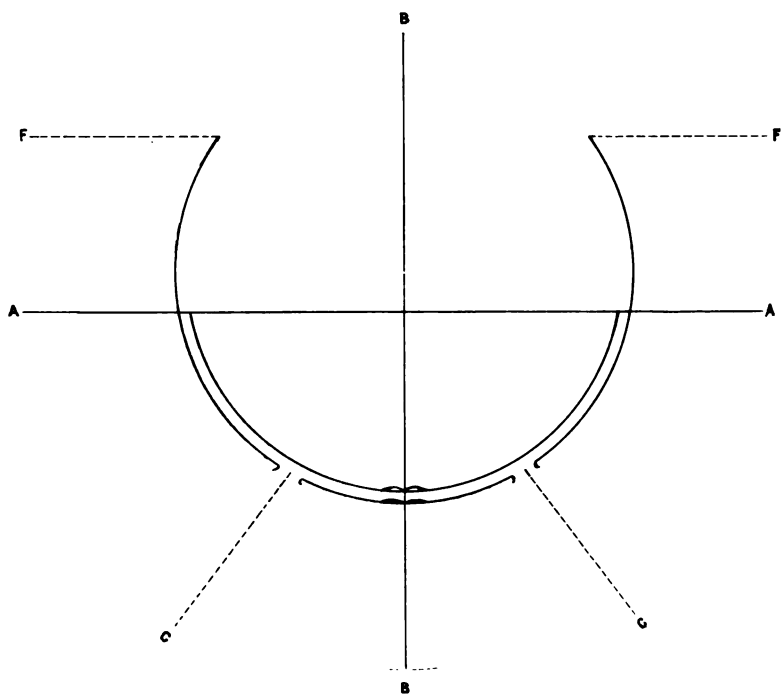
To retrace our steps may be inconvenient; still, better so than to press forwards encumbered by a weight of cumulative error.

DESCRIPTION OF PLATE.

In this diagram, corresponding halves of the retinae are placed one over the other, and in their physiological relation to each other. The larger and external curve represents the nasal halves of the retinae, the smaller and internal curve the temporal halves of the retinae. The central region extends from c to c; this is the region of *distinct vision*. The *lateral* regions extend on both sides from c to A; in these regions vision is *indistinct*. The nasal regions are represented on either side by a single line; these regions extend from A to F, are monocular, and both in *sensation* and *direction* they are *distinct*.

EXP. 1.—A black disc is presented to the *left* eye simultaneously with a square of red to the *right* eye. In the Result may be observed superposition of the retinal images, with a spreading of the black into the red.

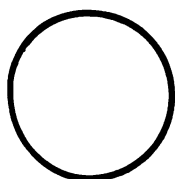
EXP. 2.—A circle of black is presented to the left eye simultaneously with a disc of red to the right eye. In the Result it is seen that the colour of the disc presented to the *right* eye is partially or wholly abstracted by the circle of black presented to the *left* eye.



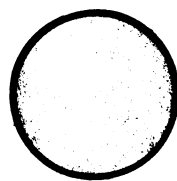
Exp². 1.



Result. 1.



Exp². 2.



Result. 2.

ON
RUPTURE OF THE URETER.

By ALFRED POLAND.

IN vol. xxvii of the 'Medico-Chirurgical Transactions' Mr. Stanley has given an account of two cases of rupture of the ureter, or pelvis of the kidney, caused by external violence, and followed by large effusion of urine into the surrounding tissues, causing a fluctuating tumour.

The injury, no doubt, is one of great rarity, insomuch that, previous to the detail of the above cases, and even subsequently up to the present date, no other reference has been made to this accident, either in surgical works or in the several medical journals and transactions.

We have, therefore, taken the present opportunity of adding another case to those of Mr. Stanley, a case interesting in many points of view, not only as regards the rupture of the ureter, but from the remarkable and unusual complications which rendered the nature of the accident obscure during the brief period of the woman's existence.

The case is detailed as fully as the report permits, and the examination of the body after death has been carefully drawn up by Dr. Moxon.

We have referred to a few other cases of injury to the ureter, so as, if possible, to draw some legitimate conclusions and deductions respecting the symptoms, diagnosis, and prognosis of this obscure lesion.

CASE 1.—*Severe contusion of the abdomen during pregnancy; ruptured ureter; abdominal lesions; abortion; death on sixth day; post-mortem appearances; blood-clots in the renal vessels.*

Emily M—, æt. 33, married, had had seven children, and was in the fifth month of pregnancy. She was a well-formed woman, of moderate height. At about half-past 11 o'clock on the evening of the 21st of January, 1868, she was trying to get out of a railway carriage, which was just stopping, but still in very slight motion; she fell between the platform and the train; the step of the carriage caught her at the level of the umbilicus, and slowly twisted the woman, who was still in the erect position, so that her whole body was made to describe a half revolution between the step of the carriage and the perpendicular face of the platform. The patient was not rendered insensible, and was immediately placed in a cab and was brought to Guy's Hospital about midnight. On admission there was a severe bruise over the right shin, and a discoloration of the skin to the left of the umbilicus, extending to the loin. There was a small superficial wound about an inch and a half to the left and a little above the umbilicus, large enough to admit the tip of a finger; through this a probe was introduced, and its whole length passed into a large cavity to the left of the umbilicus, and which seemed to be produced by the tearing away of the skin from the subjacent parts, and also by laceration of the fibres of the rectus and other abdominal muscles. A compress was applied over this part, and perfect quietude enjoined.

On the following day, January 22nd, she was pretty easy, although she had vomited during the early hours of the morning; there was no blood in the ejected matters. A few drops of urine were passed in the course of the afternoon.

On the 23rd the patient began first to complain of pain across the abdomen, which, however, was not distended; no motion had been passed since admission, and no water, barring the few drops voided the day before. A catheter was therefore introduced into the bladder, but not a drop of urine could be drawn off. The pulse 105, rather throbbing.

On the 24th she was much the same, but had a distressed and anxious look, and a somewhat yellowish complexion; the

pulse 104; no water or motion passed, but a slight trace of blood came away from the rectum in the evening. A catheter was again introduced, but failed to collect any water.

On the morning of the 25th the patient passed naturally a very small quantity of water, with a motion, but, as these were accidentally thrown away, one could not verify the fact of the nature of the fluid passed. On this day the compress and bandage were removed, and a small tumour was found over the site of the injury; the skin covering it was very tense, and of a deep purple colour, which coloration extended for some distance round. On careful manipulation the tumour proved to be intestine, which could readily be replaced in the abdomen through a very large rent in the rectus muscle. The compress was again applied, and confined by straps of plaster. The pulse was very feeble and irregular, not admitting of reckoning; the respiration 43, and mostly thoracic; she appeared to be suffering from masked peritonitis.

In the evening she was still suffering from urgent vomiting, ejecting dark greenish fluid; the respiration had become shallow and more hurried. Pulse 143, small and soft. All she could keep down was a little ice and soda water, with small quantities of brandy. Medicines and food could not be retained. Opium was administered, and with good effect.

On the 26th the anterior part of the abdomen, at the site of the large sac before mentioned, was again examined in order to explain the incessant sickness; there was again the elastic tumour, very painful on pressure, but which readily subsided on gentle equable pressure. The abdomen in other parts was not tender on pressure. No urine or fæces had been passed since the morning of the 25th. Early on the 26th symptoms of labour came on; the obstetric resident was immediately summoned, who delivered her rapidly and easily of a still-born foetus; there was but little hæmorrhage. In the evening the pulse was small and soft, 142. Respiration 58, and partially abdominal. During the ensuing night her bowels were relieved of a copious black stool, the dark colour being apparently caused by digested blood. She had beef-tea injections, which were retained. The patient continued very low and prostrate, and was gradually sinking. She died at 2 p.m. on January 27th, having lived 135 hours after the accident.

The following account of the post-mortem appearances is from the report made by Dr. Moxon.

External appearances.—A wound to the left side of and above the umbilicus, the whole anterior surface of the abdomen being remarkably ecchymosed; the wound led into a hernial space in the subcutaneous tissue on the outside of the rectus muscle and its sheath. In the sac were coils of small intestine (about sixteen inches), easily reducible, also some omentum which was adherent to a moderate extent. These parts had protruded through a hole in the rectus and its sheath, which hole was about an inch and a-quarter in diameter, and was circular. The peritoneum was ruptured, and to the same extent, so that the hernia had no sac. It was into this cavity that the probe had entered as mentioned in the report.

Lungs.—Healthy looking; no disease.

Heart.—Weight, ten ounces. *Right* side contained tough fibrin, filling especially the apex of the right ventricle and the appendix of the auricle. *Left* side also had much tough fibrin in the auricle. Left ventricle empty. The heart was contracted firmly.

Aorta.—Perfect in its whole length.

Inferior vena cava uninjured. The *right ovarian vein*, where it ran up in the sloughy subperitoneal tissue, was opaque and thickened.

On opening the abdomen the intestines were found collapsed, no sign whatever of peritonitis being present.

The right lumbar region was raised in a great swelling, this being moderately dark in colour from some effusion of blood.

About the left kidney there was a little blood effused.

The *spines* of the fifth, fourth, third, second, and first lumbar vertebræ were broken off. There was no red ecchymosis about the fractures (which had been felt during life), but some fibrinous effusion was present around two at least of these spines.

The *left twelfth rib* was broken at two points—near its end and at its neck; the *right twelfth rib* near its neck; the *transverse processes* were broken off the three upper lumbar vertebræ on both sides.

The swollen parts about the right kidney were in a gelatinous condition and smelt putrescent; they were turbid, grey, and jelly-like.

On examination it was found that the *right ureter* was torn quite across just below the pelvis of the kidney, so that it ended by a broken end in the middle of the above half-sloughy tissues, which middle part was softened down and destroyed.

The *capsule of the right kidney* was separated from the kidney itself by a considerable quantity of blood-clot; the separation was over the front of the organ; the capsule prevented the blood from mixing with the urine extravasated from the ureter. The blood under the capsule of the kidney had come from a rent on the back and lower end of the organ; the rent ran down and opened a branch of a vein at the root of one of the pyramids.

The *supra-renal capsule* of the same side had extravasation of blood into its central part.

The *left kidney* was in a very remarkable condition; it had a buff-pink colour, or rather a yellow-clay colour, very opaque and dead-looking; the colour was like that of a fatty kidney, but the dead yellowishness was more striking. On section it was found that the whole of the vessels were blocked up with ante-mortem clots; this extended in the artery as well as in the veins into the principal vessel, near its division, where in the vein it was unadherent, but in the artery adherent firmly to the walls, as though it had long been present; there was no wound of the arterial coats.

The left ovary contained a corpus luteum of large size, the convoluted exterior being well marked. The uterus weighed twenty ounces; it contained about one ounce of fibrinous clot; its sinuses contained firm ante-mortem clots in great numbers.

Remarks.—On careful perusal of the history, symptoms, and result of the foregoing case, with the evidence of the extensive lesions, as shown in the examination of the body after death, there are many very important circumstances which require especial notice. The points for the consideration of the surgeon are, first, the laceration of the rectus abdominis muscle and its sheath, allowing the protrusion of sixteen inches of small intestines; and secondly, the completely tearing across of the right ureter just below the pelvis of the kidney. Next in importance is the peculiar condition of the kidney and the clotting of the blood in its vessels, preventing the secretion of urine. This latter condition we shall not enter into, as

Dr. Moxon has fully investigated the subject, and has placed the results of his investigation in a paper which will follow our own. The pregnant condition of the woman, and the abortion consequent upon the injury, offered no remarkable circumstance beyond being serious complications.

As regards the first lesion, viz. rupture of the muscle, the nature of the accident will sufficiently account for it, and although the integumental parietes were not involved, yet we are perfectly aware that the abdominal muscles may be torn through, from a blow received externally during a state of extreme tension of the muscles, without any apparent external evidence of the lesion. In this case, as in other instances, the signs were a separation or retraction of the fibres, leaving an interspace, dent, or gap, which could be readily felt; but as effusion of blood almost immediately followed, this filled up the space, and, there partially coagulating, presented to the feel a fluctuating uniform surface, which rendered obscure any evidence of the real mischief, and was supposed by some to be a rapidly formed diffused abscess. However, a great deal of the effused fluid subsided, and a protrusion of a coil of bowel was found manifestly occupying the site of the tumour; this could be reduced, and the rent in the muscles became apparent to the touch. We need not go out of our way by adopting Mr. Guthrie's explanation, viz. "that severe blows on the abdomen give rise to the absorption of the muscular structures, and the formation, in many instances, of a ventral hernia." Absorption of muscular tissue from a blow is not quite consonant with the present state of pathological observation and surgical experience. In the cases he adduces there evidently was complete rupture of the muscular fibres in the first instance, but the rent was not discovered at the time in consequence of the effusion of blood, and so soon as the latter became absorbed the space between the ruptured ends of the muscle became apparent, not from absorption of the muscle, but from absorption of the blood.

In reference to lesion of the abdominal muscles from blows, without any external lesion, it has fallen to our lot to have witnessed some cases of rupture of these muscles from contusion, without any other lesion, either of the integument or the peritoneum. We can recall two cases in particular, where the recti

muscles were completely torn away in the upper part of the hypogastric regions, so that the fingers could be laid in a dent between the retracted ends of the muscles. These both occurred in the wards of Guy's Hospital, and in men of an advanced period of life, suffering under organic disease. The one was in an advanced stage of bladder and kidney mischief, the sequelæ of old stricture; the other was suffering from a relapse, after continued fever. They had both been lying in bed for some time, and they met with a similar accident, namely, that having been out of bed for a short time, and feeling weak, they endeavoured to regain it, when they slipped and fell across the iron rods of the bedstead. In the fever case there was great ecchymosis, and the patient lived eight days, dying of ulcerated bowels. In the stricture case there was no bruise whatever, the man dying twelve hours after the accident. On a post-mortem examination in each case the recti muscles were found completely torn across in the middle of the hypogastric region, the edges ragged, and much retracted; in one case coagulated blood was spread over the extremity of the muscle and in between its divided edges, appearing as if only just poured out; in the other there was great ecchymosis and effusion of fluid blood, without the least trace of coagulum or repair.

However, a case much more in point is published in the 'Lancet', 1826, vol. ix, p. 238, which in many respects resembles the lesion and conditions found in our present case.

John Watson, æt. 30, St. Bartholomew's, Mr. Vincent.—Kicked by horse. Scalp wound; fractured frontal bones, and bones of face. There was seen on the abdomen, situated mid-distance between the anterior superior spine of ilium and umbilicus, an elevated and globular swelling, which, upon being pressed, communicated to the fingers a feeling of fluctuation. He was perfectly sensible. In the evening the tumour in the abdomen was more diffused and enlarged; it had lost its globular appearance, and, commencing in the right inguinal region, ran obliquely upwards and outwards towards the right lumbar region. It was covered with an erysipelatous redness, and looked much inflamed. The integuments covering it appeared to be but the mere skin, for on being touched it felt like an abscess on the point of bursting. There was great heat in it, but he did not

complain of any pain on pressure. Enemata, purgatives, leeches to abdomen. Bowels relieved. Died in forty hours.

Post-mortem.—Rupture of the abdominal muscles and peritoneum; considerable portion of ileum protruding through in a very vascular and highly inflamed state, lying under integument. Extensive fracture of bones of face, ethmoid and frontal.—‘*Lancet*,’ 1826, vol. ix, p. 238.

Before entering upon the subject of ruptured ureter in reference to the symptoms, diagnosis, and termination of such a lesion, it will be as well to append a short abstract of Mr. Stanley’s two cases for comparison, and also to add two other cases which bear upon the subject, viz. wounds of the ureter. We have also thought fit to add Mr. Hilton’s case (see the ‘*Guy’s Hospital Reports*’ for 1868), although complicated with severe lesion of the kidney. By so doing we may ascertain the probable indications of such a lesion, and observe the results which may be expected to take place.

CASE 2.—Mr. Stanley, ‘*Med.-Chir. Trans.*,’ vol. xxvii.—A boy, *æt.* 9, met with an injury to the pelvis, having been squeezed between the wheel of a cart and the curbstone. He was unable to walk, and complained of great pain in the lower part of the abdomen. There was ecchymosis around the pelvis. The urine passed naturally. Inflammation and suppuration about the seat of injury ensued. In six weeks a large tumour formed in the right lumbar region, extending to the linea alba, and had distinct fluctuation. This was punctured six times, and a clear yellow fluid was drawn off; it contained urea and the ordinary ingredients of the urine; fifty-one ounces escaped at one time and seventy-two ounces at another. The boy recovered.

CASE 3.—Mr. Stanley, ‘*Med.-Chir. Trans.*,’ vol. xxvii.—A woman was knocked down and pushed before the wheel of a cart, injuring the right hypochondrium, and causing a fracture of the femur on the left side. There was considerable pain on pressure at the seat of injury, tension of the abdomen, and subsequent febrile disturbance, requiring antiphlogistic treatment. Urine passed naturally and freely. This was followed by the appearance of a circumscribed painful swelling in the right hypochondrium; it was punctured, and two to three pints of a straw-coloured fluid evacuated, and again a second time. The fluid was albuminous, and contained urea. Death took place in the tenth week.

On examination there was a large cyst extending from the diaphragm to the pelvis. There was a passage from the upper part of this cyst to the pelvis of the kidney, where a large irregular aperture existed. The liver presented, at its anterior border, the marks of a slight laceration of its tissue, which was in process of healing.

CASE 4.—Mr. Hilton, 'Guy's Hosp. Reports,' 1868.—A labourer, *æt.* 21, strong and firmly built and in good health. Was crossing a railway, when an engine, moving slowly, knocked him off the rails, and it was supposed that the buffer struck his abdomen. He had slight collapse and became very restless, and vomited fluid coloured brown by the porter he had previously swallowed, but containing no blood. He complained of great pain in the abdomen just below the ribs, aggravated by the slightest pressure, but he could take a deep breath without trouble. On the following day there was inability to void urine, and a catheter was introduced, drawing off a pint and a half of bloody urine. The vomiting and passing of bloody urine continued up to the sixth day, when these subsided. On the seventh day blood again appeared in the urine, and gradually diminished up to the thirteenth day, when, in the evening of that day, he vomited and fresh hæmorrhage immediately supervened. The pure blood was arterial, and came away so quick that it had not time to coagulate. On the fourteenth day he was unable to micturate, and a catheter was passed, but it soon became plugged, and on its withdrawal a clot of dark blood was found in its eye.

The patient had at length peritonitis, from which he died on the twenty-sixth day.

During life there was evident swelling over the left kidney and dulness on percussion at that spot.

On examination there did not appear any positive evidence of peritonitis; there was a quantity of blood in the peritoneum, which had entered that cavity through a sloughing opening in front of the left kidney. There was a swelling over the left kidney bearing forwards the descending colon, which was bound to it by a thicker connection than is natural; it did not reach beyond the middle line of the vertebral column. It formed a large cavity, surrounding the left kidney and filled with ill-conditioned, grumous, clotty blood, so as to constitute a sort of large diffused aneurism. The left kidney was broken across the middle, and the lower segment was cracked transversely by very numerous minute fissures, running vertical to its surface. The left ureter opened into this large cavity, and so did a branch of the left renal artery, on which was seated a small recent aneurism.

The following two cases are gunshot wounds of the ureter:

CASE 5.—Mr. Hennen, 'Military Surgery,' p. 455.—An officer met with a gunshot wound. The ball was an ordinary one, and entered the interval between the ninth and tenth ribs, midway between the sternum and spine, and was cut out at the point of the transverse process of the twelfth dorsal vertebra, the ball having traversed the abdomen.

He suffered at once extreme agony, and his immediate death was apprehended. On rallying he had great desire to pass the urine, which flowed copiously, but more like blood. He had subsequently great pain and inflammation of the bowels, and an attack of acute peritonitis with delirium. He was bled, blistered, and placed on low diet, and recovered.

On the seventh week he had another attack of peritonitis, followed by a tumour in the site of the posterior wound; this was opened in the course of a fortnight, and six ounces of pus of a urinous smell were evacuated. He complained of

severe pain, and another abscess formed lower down, which was punctured and gave exit to urinous pus. For eight months he suffered pain and became greatly emaciated; he had also occasional attacks of retention, one of which lasted for two days, when he expelled, through the urethra, a piece of cloth three fourths of an inch long and of the shape of a shrimp. He then made a complete recovery.

CASE 6.—The Archbishop of Paris was wounded on the 29th of June, 1848. A musket-ball entered the upper part of the lumbar region close to the right of the spine, and lodged. Great depression immediately ensued, with nausea and vomiting; he was pale and anxious, and complained of intense pain in the back and in the course of the sciatic nerve; there was paralysis of the limbs. The urine flowed in great quantities from the wound, and there was no water in the bladder. The abdomen was flaccid and not tender. The wound was dilated in order to remove the ball, but without success. He died in eighteen hours.

On examination there was much infiltration of urine in the surrounding parts; the left ureter was divided close to the pelvis of the kidney. The ball had traversed the spine at the third lumbar vertebra, dividing the cauda equina below its origin, and was found lodged in the psoas muscle. ('Gaz. des Hôpitaux,' 1848.)

Remarks on rupture of the ureter.

The ureter, in its anatomical disposition, is a long canal leading from the kidney to the bladder, and is so placed as almost to secure it from all external injury; it lies behind the peritoneum, along the posterior wall of the abdomen, and is protected on all sides; the only parts which are at all vulnerable are its commencement from the kidney, called the pelvis, and the first part of its course for a few inches. Here it is situated in the loin, and may undergo stretching from inordinate torsion of the body, or may be exposed to external violence from severe contusions in this region. Hence, in all cases recorded, injury to the ureter has been found close to the kidney.

The ureter may be subject to lesions of several kinds; thus, it may be ruptured from severe contusion without lesion of any other important structure, the urine escaping into the cellular tissue behind the peritoneum; the rupture may involve the peritoneum, inducing peritonitis; or it may be complicated with lesion of the kidneys and other important structures. The ureter has also been injured by penetrating wounds, as in the instances adduced; and, again, it may become obliterated and induce disease of the kidney, as related in Case 7, *infra*.

The causes we should, of course, expect to be of the most violent kind, setting aside external penetrating wounds; thus,

in Case 1 it was the rolling of the body, while in an erect position, between the step of a railway carriage and the platform, catching the sufferer at a level with the umbilicus; in Case 2 it was the squeezing between the wheel of a cart and the curbstone; in Case 3 the person was knocked down and pushed before the wheel of a cart; in Case 4 the buffer of an engine, proceeding slowly, struck the abdomen on the left side and knocked him off the rails.

The symptoms of this lesion are very obscure and unsatisfactory. Where it occurs from an external wound and urine flows freely through it, as in Case 6, the diagnosis is pretty safe; but where there is no external wound it is only by the subsequent effects that we gain a knowledge of the fact of its injury. Thus, in Stanley's cases (Cases 2 and 3) there were no immediate symptoms leading to a suspicion of injury to any part of the urinary apparatus; the urine passed naturally and freely, although there was much ecchymosis about the seat of mischief and much pain on pressure. In Case 1 only a few drops of urine were voided, and the introduction of the catheter on several occasions failed to draw off any water, so that for six days, the time she lived, no urine was passed, a fact which was readily explained by the renal vessels having become plugged by clot. In Case 5 there was extreme agony with a desire to pass urine, which afterwards flowed copiously, but more like blood; in Case 4 there was inability to void urine, and on introducing a catheter a pint and a half of bloody urine was drawn off, and the patient continued to pass bloody urine up to the sixth day; in this latter instance there was the complication of ruptured kidney, the evident source of the blood; and, in all probability, the kidney was involved in Case 5. Thus, then, we have no direct evidence of an injured ureter in the early development of the symptoms.

The absence of peritonitis in Cases 1, 2, 4, and 6, is remarkable. In two of them it was considered, during life, to be present, but this was disproved on post-mortem examination. That it did not occur can only be accounted for by the fact that the urine became extravasated into the cellular tissue behind the peritoneum, and there formed a bag or cyst for itself, cutting off any implication of the peritoneum. In several of these cases nature had already commenced the work of repair,

and would have successfully completed it, had there not been other serious complications.

In Case 2 a large tumour formed at the end of six weeks, which was punctured six times, and the fluid contained urea and the ordinary ingredients of the urine; the boy recovered. In Case 3 a similar large circumscribed swelling formed, which also was tapped twice, giving exit to two to three pints of urinous fluid; the patient, however, succumbed in the tenth week. In Case 1, had the kidneys secreted, there would have been a like condition; as it was, the patient lived six days, and on examination the right ureter was torn quite across just below the pelvis of the kidney, so that it terminated in a broken end in the middle of half-sloughy tissues, forming a swelling about the kidney and lumbar region. In Case 4, where the patient lived twenty-six days, there was found a swelling over the left kidney, bearing forwards the descending colon; it formed a large cavity, filled with ill-conditioned, grumous, clotty blood; the ureter opened into this, as also a branch of the renal artery, and the kidney likewise, which was broken across the middle. In Case 5, in the seventh week after an attack of peritonitis, a tumour appeared in the loin, which was opened, and six ounces of pus of a urinous smell evacuated; a second abscess followed, likewise containing urine, but these healed up.

Thus, then, the following results may be expected:

1st. A fatal termination early, where other complications exist, as in Case 6; and this whether the peritoneal cavity be, or be not involved.

2nd. The subsequent formation of abscess or softening down clot, mixed with urinary secretion, which may be evacuated with success, as in Cases 2 and 5.

3rd. The existence of a urinary fistula in the loin, although we have no record of the fact.

The most remarkable case is that detailed in full by the patient himself, and quoted by Hennen (Case 5), where, after eight months' suffering from gunshot wound in the abdomen and loin, he passed a piece of cloth through the urethra; this must evidently have traversed the whole length of the ureter into the bladder.

Respecting the treatment, there is nothing to be done, with the exception of treating these cases on the ordinary principles

for injured internal organs. Quietude, rest, the avoidance of fluids and solids for some time, injections if required, but no purgatives by the mouth, ice to suck, opium to allay pain. If peritonitis should arise, it must be combated in the ordinary way. When abscess or swelling with fluctuation appears, an early opening should be made, either by incision or by puncture with a trocar, the latter to be preferred. When refilling of the cyst occurs to any great extent, after repeatedappings, it may be a question for consideration whether drainage tubes should be adjusted and the cyst kept empty; but this must depend upon the general health of the patient.

We have thought fit to add the annexed case of obliteration of the ureter following a fall. Although not strictly coming within the present category, it has an interesting connection with injury to the ureter and its consequences, and may deserve a place here.

CASE 7.—Mr. Haviland, 'Path. Trans. Lond.,' vol. x, p. 209. A lad, aged between eighteen and nineteen years. Up to his thirteenth year he was a fine healthy lad, when he fell on his back from a height of twenty or thirty feet; but he appeared only to be shaken and soon recovered. However, since then, he had been the subject of a painful incontinence of urine, and his sufferings had been intense, both in his urinary passages and in his loins. The urine appears to have been charged with pus, and was frequently bloody. At one time he was under treatment for six months without permanent benefit, as the symptoms recurred. He passed from time to time a great number of scybalous fæces, and before death his prominent symptoms were obstinate sickness and pain in the epigastrium, added to increased dysuria and incontinence.

After death the left kidney was found to have lost all its original structure, and to be converted into a number of sacs, containing a pus-like fluid, each cavity being lined with a distinct membrane, which, when separated, preserved the form of the abscess. These cavities seemed to have no outlet. The left ureter was atrophied and impervious, and, with the vessels, was surrounded by a great quantity of fat. The right kidney was hypertrophied and pale, having a cavity at one of its extremities, which contained pus; the right ureter was considerably enlarged and embedded in fat, which also contained a great number of indurated lymphatic glands. The bladder was reduced greatly in size, its mucous membrane soft, thrown into rugæ, and bedewed with pus. The urethra was in a similar state. The colon was filled, from one end to the other, with impacted fæces.

Several years ago the kidneys of a new-born child of mature development were sent to me at Guy's Hospital for examination. The child had not lived many days. The kidneys were of large size, and the capsule was raised at innumerable points by vesicles

varying from the size of a pin's head to that of a nut. These studded the whole of the surface of both kidneys, and contained a straw-coloured fluid having all the characters of urine. The ureters were altogether absent; and the pelvis of the kidney quite undeveloped, presenting the appearance of a dense membrane closing the hilus. A coloured drawing was made at the time, but it has been lost or abstracted from the museum.

TWO CASES
OF
THROMBOSIS OF THE RENAL VESSELS
THROUGH INJURY TO THE LUMBAR SPINE;
WITH GENERAL REMARKS ON THROMBOSIS.

By W. MOXON, M.D.

IN the preceding paper Mr. Poland has given the report of a case of ruptured right ureter in a woman, who had suffered severe injury to the lumbar spine. The entire occlusion of the vessels of the left or uninjured kidney¹ (at least, there was no sign of direct violence to it) is a circumstance that must excite our interest. It has happened to me to meet with a nearly complete obstruction of the vessels of both kidneys in one other case under very similar circumstances. This other case was as follows:—A man, aged 22, after trying to cut his throat, put himself in the way of a railway train. The engine struck him and knocked him to one side against the wall. He was brought at once to Guy's Hospital, where he lived eight days, and died October 8th, 1865. While in the hospital he passed his evacuations under him, and the nurse said that his urine was always in great quantity, so that she had to be constantly changing the sheets. On inspecting his body I found the second and third lumbar vertebræ broken obliquely through,

¹ See page 89.

the fracture passing downwards and to the left, and the lower fragment being displaced a little upwards and to the right. There was some effusion of blood about the fracture, chiefly towards the right side, where it passed outward as far as the fleshy part of the transversalis muscle. The spinal cord appeared to be quite healthy. There was no sign of injury to the cauda equina opposite the seat of fracture. The lungs and heart were practically normal, and there was no ante-mortem clot in the cardiac cavities. The aorta and vena cava were uninjured, and were free from ante-mortem clots in all their length; the blood was chiefly liquid. The stomach and duodenum were deeply reddened within, especially about the great curvature. The duodenum and jejunum had their mucous membrane highly oedematous. The liver and spleen were uninjured. The right kidney was larger than the left and looked swollen; its colour was dull and opaque, with a yellowish cast, the appearance of the whole organ being like that commonly seen in parts of it in the early stages of cardiac embolism before the decolorization of the "infarction" has far advanced. All its vessels, arteries as well as veins, were obstructed by ante-mortem clot, which distended the vessels and adhered gently to their sides. The left kidney had its lower fourth marked off from the upper three fourths by a strong plane of demarcation of a deep bright red colour, such a plane as usually surrounds "embolic" patches. The lower fourth was of smaller comparative size than the upper; it appeared to have shrunken a little; it was paler and more homogeneous-looking, and on section scarcely showed any of its natural structure; it had, indeed, the same appearance as that of the whole of the right kidney. The vessels of this part contained the same sort of ante-mortem clots as were in the right renal vessels. The vessels of the upper three fourths were free.

The microscope showed that the intertubular stroma of the diseased parts of the kidneys was charged with finer or larger fat-molecules. The Malpighian corpuscles were visible, but they were homogeneous and glistening, so that the nuclei of their capillaries could not be seen. The secreting epithelium was cloudy and confused, so that the nuclei could scarcely be seen.

While upon the subject of microscopic appearances I may mention a peculiar appearance seen in the capillary vessels of

the left or obstructed kidney of the woman. The capillaries, both intertubular and Malpighian, contained curious bodies composed of clusters of radiating minute crystals of a red colour. These bodies were all of the same size—about that of pus-corpuscles—and were present in large numbers in all parts of the kidney. Dr. Stevenson was kind enough to examine the substance of the organ chemically, but he did not find any peculiar chemical product in it. It seems likely that these bodies were some form of blood-crystal. Indeed, their colour and their situation within the capillaries make this nearly certain.

It is very remarkable that we should find this obstruction of the renal vessels in two cases accompanying injury to that region of the spinal column which corresponds with the position of the kidneys; and it is worth while to discuss the probable cause of the obstruction with reference to the circumstances in which it most commonly occurs, premising that such an obstruction on so large a scale as in these cases is exceedingly rare, and that when it occurs at all, it occurs almost always as an accident in heart disease, due to embolism of the artery by fragments from ulcerating cardiac valves or from ante-mortem clots in the cardiac cavities.

We look for explanation of ante-mortem coagulation of the blood in the vessels to the known conditions that induce experimentally the coagulation of the blood. These are, in the main, 1, Quiescence, or slowness of movement; 2, Contact of rough surfaces; and 3, Increase of coagulating fibrine.

Practically we meet with ante-mortem clots or "*thrombi*" arising *in situ* within the vessels under four conditions, if I may be allowed to create such a division of the cases. The first condition is simple and arises from quiescence of the blood; the second arises from complex causes, among which quiescence preponderates; the third also from complex causes, in which irritation preponderates; and the fourth condition is probably nearly always a misinterpretation. I mean that in the fourth sort of cases, though observers have thought that the clots they saw had formed in the vessels in which they found them, yet probably those clots had been conveyed into the vessels from elsewhere; in other words, were *emboli* and not *thrombi*.

The first class of cases and the simplest is by far the most common; it is, indeed, of every day occurrence, though as it is

not often sought for it is comparatively rarely found. These are the conditions; in bedridden dropsical persons those veins which draw blood from the buttocks, especially the circumflex veins of the thighs, or else, and very commonly, the veins of the internal genitalia, contain ante-mortem clots. The former, I suppose, because of the combined results of the pressure of the weight of the body on the radicles of the veins, and of the gravitation of the blood, which is against them, as occupying the then most dependent parts. The latter through the circumstance that the genital veins are constructed to accommodate a larger stream of blood than flows in them during states of quiescence, so that the width of the channel makes the diminished stream move yet more slowly. Such cases of dropsy, or otherwise in persons long bedridden, without the presence of inflammation or of blood poison, form the first group of cases; here the clot is a simple, generally unadherent cylinder, rounded at its ends, the containing vein being unchanged. Such clots as these have no *irritative* action, and if they form in a person who afterwards recovers will gradually harden and decolorise and ultimately calcify, forming the so-called "phleboliths" of the genital, the pelvic, or of the dependent veins generally. The presence of a phlebolith indicates a long bygone time of *simple* quiescence of circulation in the vein that contains it.

The second sort of ante-mortem clotting occurs in phthisis, and in some malignant abdominal tumours or tumours in the pelvis; it occurs in the same system of vessels as in the former cases. Here, as there, we have some stagnation of blood in the vessels, and so far the occurrence of coagulation is, as in the first class of cases, susceptible of easy explanation, but the state of the vessel is different; the clot is closely adherent, and the vein wall is thickened; and, further, if the history of the case is inquired into there is found to have been more or less pain and other symptoms of phlebitis coincident with the formation of clots in the vessel. To digress for a moment it is, by the way, not a little wonderful that we should sometimes find *the common iliac, and all its principal tributaries entirely, and on all their circumference occluded by old brown inseparable clot, yet without a trace, or with only a trace, of dropsy in the corresponding limb.* I have found this on three occasions and I cannot explain it;

we examined the veins along the sciatic nerve; these had liquid blood in them but were not large: if they had been it would not have helped us much, since these veins must have discharged through the obstructed gluteal and internal iliac vein. I can only get from it the suggestion, how exceedingly little circulation may suffice to keep life in the limbs of a person whose general vitality is at a low ebb. The universal weakness makes possible the existence of the weak part. To return to my subject: the thickening of the vein wall and the clinical phlebitis are more constantly present in phthisical patients than in those suffering from cancerous tumour. In this second class of cases we must look for some other factor of causation for the adherent clot in the inflamed vessel; we have already seen the simple result of simple stagnation, and we must account for the new conditions. Dr. Dickinson¹ instances this phthisical thrombus as an example of coagulation due to *changes in the blood*. This wide expression is, if I may so speak, capable of giving an explanation of a very low intensity but of very great quantity. Supposing that the blood is more charged with fibrine, or that its fibrine is more ready to coagulate than is natural, we have certainly a second factor for the coagula in the femoral veins which is quite congruous with the first. But the two together leave untouched the phlebitis and adhesion of the clot, which are the distinctive features of this my second class of cases. Under these circumstances I am disposed to offer the following hypothesis—namely, that, 1. The juices which are taken up in the diseased lungs and mix with the blood give it a pernicious quality—a tendency to set up, wherever the blood goes, an inflammation similar to that progressing in the lungs. 2. But this tendency is capable of being counteracted by those healthy changes in the blood which it undergoes during its circulation through the depurating organs generally. 3. Now, in those parts where conditions of stagnation exist, this purifying process is far less completely carried out than elsewhere in parts that have active circulation, and this, of course, to the last degree in parts where complete stasis is established. 4. Putting these three reflections together, I think it will be difficult to escape from the conclusion that the inflammation is set up in the stagnating veins of the con-

¹ 'St. George's Hospital Reports,' 1866.

sumptive, by the lymph which is formed in and absorbed¹ from the substance of the inflamed lung, and which is not purified in the said stagnating veins because of want of circulation there. I am strongly inclined to believe that this view represents *the* truth of the matter.

The third class of cases—the most serious of all, for these are they that give us sudden death by embolism in persons who otherwise would have completely recovered sound health—are such as we find in fevers, especially continued fever, and in pregnancy. Here, although there are still conditions of stagnation, seeing that in fevers the circulation is low and feeble, and in pregnancy there is the pressure of the uterus, yet I think no one will suppose that the stagnation is sufficient to explain the occurrence of the coagulation, especially as in either case, respectively, it generally occurs after the fever-patient begins to convalesce, or the woman is delivered. Still no doubt conditions of stagnation are present and have some part in the causation of the coagulation. In these cases the clinical signs of phlebitis are more pronounced than they are in phthisis and the second class of cases generally. There is more pain, and the swelling quickly becomes considerable so as to give rise to “white leg.” Now, here my before-stated hypothesis applies with especial force. I think it is very probable that there is in the blood a noxious material capable of setting up inflammation of the vein wall, if left long in contact with it and not purified by circulation. This noxious material is probably the product of the febrile process in the one case, and in the other of the uterine sore. And I think that the more prolonged indwelling of this in an unpurified, because stagnant, state within the veins that are subject to the pressure of the weight of the body, excites an inflammation in the vein wall, and that this inflammation roughening the wall leads to a coagulation upon the roughened surface in the usual way known to occur in phlebitis. The third class of cases then differs from the second only in this, that in the third stagnation becomes coagulation through the effect of the inflammation it excites, while in the second the coagulation probably precedes the inflammation, the noxious material not being so virulent, and hence requiring to lie longer

¹ See Virchow's able views, ‘Cell. Pathol.’ by Chance, pp. 162-165, 192.

in contact, and even then not exciting so severe an inflammation.

The fourth class of cases are chiefly such as we find on record as cases of coagulation of blood within the arteries *in situ*, especially in the pulmonary artery or the cerebral arteries. My own impression is that these cases are generally very doubtful: I mean that the origin of the clot in the arteries where it is found is generally not satisfactorily proved. Dr. Dickinson gives a very able and judicial account of five cases in which he found clots in the cerebral arteries,¹ his view of these cases being that the clot had formed *in situ*. The cases are stated most impartially and carefully, and every respect is due to the experience and candour of the observer; so that any one who did not see the specimens must dissent very diffidently from his view. Yet his account of them does not seem to me to necessitate the conclusion that the clots arose as thrombi *in situ*. They may have been emboli carried in. For three of the five cases were cases of heart disease, which suggests the probability of embolism; and in one it is noticed that the clots "had a tendency" to lodge on the cardiac side of bifurcations of the arteries, a circumstance which again suggests embolism. It is true that no clots were found in the heart, and no vegetations or ulcerations were present, such as would have furnished fragments for impaction; but I would remark that the absence of such appearances does not prove that there was no material that could have been carried from the heart to the arteries. In proof of this I will instance the following case. A short time ago I made an inspection and found a large ante-mortem clot in the pulmonary artery stuffing both right and left branches, and I searched in vain everywhere for any sign of clot to explain its source. I was just giving up the inquiry when my friend and pupil Mr. Goodhart pointed out that on one side of the clot there were markings corresponding to the impressions of the auricular appendix. These were quite unmistakeable, and on turning to the right auricle there were in the recesses of some of the columnæ carneæ of its appendix fragments of clot which corresponded in appearance with the clot in the pulmonary artery, so that no doubt could remain that the large clot had been loosened from the right auricle and, passing on,

¹ Loc. cit.

into the pulmonary artery, had so caused death. I am strongly of opinion that this is not a very uncommon occurrence, and is the true explanation of many cases in which coagulation of blood in the pulmonary artery is said to have occurred. In more direct reference to Dr. Dickinson's cases I will give another case which I met on 19th June, 1868, as follows: A man was wheeling a barrow and fell insensible; he was brought to Guy's, and in the course of some hours appeared to be slowly recovering; but then he suddenly died—as far as I could gather from the nurse who was present—in convulsion. I found on inspection a "button-hole" mitral valve without vegetations, and loose clots in the auricular appendages; these were the only clots present, except in the part of the right Sylvian artery corresponding to the "Island of Reil," where there was an ante-mortem clot *stuffed* the vessel, but not adherent to its wall. There were also several "embolic" pale patches in the kidneys, showing, indeed, at least three stages of that common process which is usually ascribed to embolism. This case corresponds very closely with Dr. Dickinson's cases, but in it there were present in the kidney proofs of occurrence of emboli, and there were in the auricle of the heart masses of fibrine which might, if they existed during life, have been thrown on into the cerebral or any other systemic arteries. Under these circumstances it seems to me likely that such a coagulation had occurred behind the obstructed mitral during a temporary embarrassment of the heart's action, and that the clot so formed, *loose and recent as it was*, had been carried on to the right Sylvian artery (the artery usually suffering from embolism), so causing the cerebral symptoms. But it seems to me unlikely that in the arteries of the brain there should arise a coagulation of the blood, it yet remaining liquid in the veins where the blood is comparatively stagnant. I cannot avoid the conclusion that the like view is more applicable to Dr. Dickinson's cases than is that which he adopts of coagulation *in situ* in the arteries. Another case, which will seem to strengthen this conclusion, is one of a most highly interesting nature, recorded by Dr. Murchison.¹ It was a case of typhus fever, in which there occurred obstruction of the left femoral vein and of the right femoral artery and vein, with

¹ 'Path. Trans.,' xvi, p. 93-5.

gangrene of both legs. There was also complete infarction of the right renal artery, with an appearance of the right kidney like that resulting from embolism. In this case Dr. Murchison found within the left ventricle several masses of firm decolorised fibrine slightly adherent, and he favours the impression that the obstruction of the femoral and renal arteries was due to embolic plugging with such clot as that still remaining in the left ventricle. At the same time, he remarks on the fact that beyond the embolised clot each artery showed signs of inflammation, being lined by other clot which did not fill its calibre, but adhered to its walls as a lining layer. The hypothesis I have before stated will account for this arterial inflammation in the following way. The blood depraved by the fever was only innocent to the vessel's walls while it was still flowing, and when it became stagnant and could no longer be purified, and still more, when it coagulated, it inflamed the surface with which it was in contact; hence the clots that were thrown from the left ventricle into the renal and femoral arteries induced an inflammation in the walls of those vessels. In this case it appears that the clots were formed through partial quiescence of the blood in the left ventricle, and had been moved thence into the arteries where they were found.

In short, this fourth class of cases of thrombosis of arteries I cannot but strongly suspect are really instances of embolism, when they are of the kind usually described, *i. e.* sudden obstruction of the pulmonary or of the cerebral arteries, the tissue of the lung or brain respectively being itself healthy.

There is great ambiguity and uncertainty in the use of the words *thrombosis* and *embolism* in the ordinary description of cases of obstruction of arteries. This is much to be regretted, for if the profession is ever to acquire an established and clear view of the pathology of ante-mortem coagulation, it is through careful and thorough examination of this fourth class of cases. At present it is plain from the perusal of the reports that from time to time appear in the medical papers, that a very doubtful state of mind prevails on this important subject. As to clots in the veins there is of course no uncertainty. These are, except in the portal vein, which is an artery except in name, necessarily recognised as "autochthonous," or formed in the place where they are found, and the word *thrombosis* is used constantly in

describing them. But when we take accounts of obstruction of arteries we find the words thrombosis and embolism used in a most confusingly indifferent way.

Thus, in the last Biennial Retrospect of the Sydenham Society, if we turn to the account of "Puerperal Thrombosis," p. 419, we find a case which is said to be "related as a case of embolism," but the description which is given—"both branches of the pulmonary artery contained light-coloured fibrinous clots which pulled in branches"—conveys the impression that the describer believed the clots to have formed in the artery, for he makes no mention of clots in the veins, and his description of the clots as in branches, seems to indicate that they were moulded to the branches of the pulmonary artery and had formed there, in which case the word thrombosis, not embolism, would be applicable. On the same page is a case of "embolia of the pulmonary artery," the description of which says that in the right chief branch of the pulmonary artery was a pale red delicate "thrombus" plugging the vessel. Now, as the word embolia is used, the reader is led to suppose that the clot was carried into the artery from some other place, but the use of the word thrombus in the description of the artery, and the non-discovery of the vein from which the clot might have been moved, induce the contrary impression that it had formed in the pulmonary artery.

I believe this doubtful and vacillating expression does not arise from any uncertainty as to the meaning of the words thus promiscuously used, but rather arises from the describer's uncertainty in regard to the facts. In other words, it is not a better general knowledge of the relative meanings of the words embolism and thrombosis that is required in order that we may get more satisfactory descriptions of cases that are published, but it is necessary that the describers should observe the facts of the case so as to know whether the clot found was formed in the artery where it is seen (if it is an ante-mortem clot at all), or whether it came from any vein or from the heart, and was carried into the artery it is seen to occupy.

I have before expressed my belief that these cases are really cases of embolism and not of thrombosis, *i. e.* that the clot is carried from the veins or heart into the artery, and is not formed in the artery. I doubt very much such accounts as

that on the same page of the retrospect as has before been mentioned, in which account the *upper part of the aorta* is described as containing ante-mortem clots, and I think it is exceedingly unlikely that such clots existed before death.

The sudden coagulation of the blood in arteries, while it should remain liquid in the corresponding veins, would be an occurrence so contrary to our natural conclusions from the circumstances existing in those vessels, that we should not adopt a belief in it without most compulsory evidence.

The one great cause of coagulation which makes possible the efficacy of the others is stagnation. The other causes act with this, but they require it; and whereas stagnation acts locally, the other causes—such as qualitative changes in the blood—act universally. So that the stagnation must be the *determining* circumstance which induces the coagulation to occur at one part of the blood's course rather than another. Now, in the arteries the stream is more rapid and under greater pressure than in the veins. How, then, can stagnation arise in the former while the latter are free from it? Of course, this is not the kind of reasoning that must settle a physical inquiry. Observed facts might oblige us to allow that, in spite of antecedent improbability, coagulation does occur in healthy arteries and not in the corresponding veins, but the opposing reasons should make us very scrutinously exacting towards the observations which antagonise them, and must oblige us to reject as insufficient any cases where the state of the veins and cardiac cavities was not most carefully ascertained. We have had, in Guy's post-mortem room, nearly one hundred cases of arterial obstruction, and only three times (exclusive of the cases now under discussion) have I failed to find thrombus in the veins or heart, or else valvular ulceration or vegetations, such as would furnish cause for an arterial embolism; and this, although the inspection is necessarily limited, for it is not often possible to carry our researches far into the veins of the limbs.

Nevertheless, the two cases which have led to these remarks on thrombosis and embolism are, I believe, true cases of *thrombosis* of the renal arteries and veins. A most careful search failed to find any ante-mortem clots in the heart, the like of which might have moved on to embolise the arteries. And

indeed the entire occlusion of one renal artery with almost entire occlusion of the other, while no other arteries were obstructed, could scarcely have happened by the casual entry of such a quantity of floating clots into the renal arteries only; while the presence of similar clots in the veins is not explained by the supposition of embolism.

The circumstances differ essentially from those of cases of presumed occurrence of ante-mortem coagulation in the healthy arteries of uninjured organs. In both cases there was very severe injury to the region of the kidneys, and injury of a sort that was calculated to do greater damage than that—terrible as it was—which was seen in the lacerations and fractures present. The severity of the shock to the kidneys, which lay close to the injured part of the spine, must have been excessive; the man appeared to have been struck in the back by the buffer of an engine, and the woman was rolled along between a train and the platform until the processes were ground off her lumbar vertebræ. Such violence, just in the bed of the kidney, was surely the cause of the state of its vessels in some direct way. I opened up the aorta and cava, fully expecting to find some injury to their coats,¹ but the channels of these vessels were quite free and their walls unhurt. As has been already stated in the reports of the cases, there was no laceration of those kidneys which had the clots in their vessels, but the opposite kidney of the woman curiously had its ureter torn. Now, this rupture of the ureter—seeing that there was no wound leading to that tube, which is small and rather moveable—is itself a very convincing evidence of the enormous severity of the mechanical violence that had been in play about those parts. A strain or squeeze that *tore* across the ureter in its loose bed could *not* have done *only* this, the parts in that region that did not give way must have received a very severe shock. The impression that one

¹ Rupture of the great arteries in cases of violent blows or shocks may occur at a distance from the site of application of the violence. A remarkable case is given by v. Recklinghausen, 'Virch. Arch.,' in which a man fell on his shoulder, and lived four weeks with severe symptoms. On inspection, besides other injuries, a transverse rent was found in the commencement of the celiac artery three lines long, the borders turned in and covered with a layer of thrombus which extended into the coronary and part of the splenic arteries. The mucous membrane of the stomach showed irregular patches with bluish borders and red surfaces, and the arteries in these patches were plugged with emboli.

gets by thinking over the case and endeavouring to realise the degree of violence that the organs experienced, prepares one to believe that the squeeze which the kidneys got killed them or lowered their vitality extremely, just as tightening a rope around a man's leg sometimes destroys the life of the zone of skin that received the pressure and causes the skin to slough. If Professor Brücke's theory of the cause of *fluidity* of the blood—and it is this point which needs inquiry, rather than the cause of *coagulation*—be correct, and the blood, indeed, depend for its fluidity on the life of the containing parts, then we see a cause of coagulation in any occurrence which sufficiently lowers the vitality of the part concerned, and on this principle the explaining power of a blow from a railway engine seems unlimited.

These cases, then, being instances of local damage to the organs in whose arteries and veins the clots were found, do not give any countenance to the supposition of the occurrence of coagulation in the arteries of healthy and uninjured organs.

ON
HOMICIDAL AND SUICIDAL WOUNDS
OF THE THROAT.

By ALFRED S. TAYLOR, M.D., F.R.S.

The power of locomotion or struggling after wounds of the trachea, the common carotid artery, and the internal jugular vein—Inference of the time of death from the condition of the dead body—Remarks on the case of John Wiggins.

THERE is no more difficult question which can be placed before a medical jurist than that in which he is required to say whether a fatal wound in the throat, involving the trachea and great blood-vessels, has been self-inflicted or inflicted by the hand of another. Murder may be charged against a person known to have been present at or about the time of death, and the defence may be that the act was one of suicide. A medical witness can rarely be in a position to return an absolute answer to such a question, or affirm that it was impossible that the wound could have been self-inflicted. At most he can say it was highly improbable, but he would find himself generally compelled to admit that the medical circumstances were reconcilable with the hypothesis either of suicide or homicide. Every case of this kind must be determined not merely by the medical facts connected with the wound, which are scarcely similar in any two cases, but by the whole of the moral and

circumstantial evidence. The circumstances under which a dead body is found,—the account given by the supposed assailant, its consistency or inconsistency with the other facts proved in the case—the manufacture of evidence to rebut a presumption of his guilt, and the motive for the act, either of suicide or murder, are matters with which it is the special province of a jury to deal. They are often such as to fill up the blank left by the scientific evidence, and to lead the jury to that conclusion which a conscientious medical witness would decline to draw, namely, that beyond all reasonable doubt the wound was inflicted by the hand of a murderer.

JOHN WIGGINS was indicted for the murder of Agnes Oaks, at the Central Criminal Court, on the 25th September, 1867, and after two days' trial was convicted of the crime and subsequently executed. The medical evidence proved that an unusually severe wound had been inflicted on the throat of the deceased woman, and that there was a slight and superficial wound on the throat of the prisoner. For the prosecution, it was contended that the prisoner had cut the throat of the deceased, and had afterwards made the wound in his own throat for the purpose of averting suspicion from himself. The defence was that deceased had first attempted the life of the prisoner by inflicting the wound in his throat, and failing in this she had afterwards committed suicide by producing on herself the very severe wound which was found on an inspection of her body.

A few weeks before the trial Dr. Wilks and myself were separately consulted, on the part of the Crown, respecting the leading medical points on which the case for the prosecution rested. The clothes worn by the prisoner and the knife with which the wounds were alleged to have been inflicted were forwarded to me for examination.

My report on the medical facts of the case, as observed by Mr. Horton and Mr. Dove, two medical gentlemen who examined the deceased and prisoner, was made subsequently to that of Dr. Wilks, and without any communication with him. The opinion therein expressed agreed with his on all the substantial facts of the case. I subjoin the conclusions from the report to the solicitor for the Treasury.—1. On the deposition of Mr.

Horton regarding the deceased woman; 2. The deposition of Mr. Dove regarding the wound on the prisoner's neck; and, 3. The results of the examination of the clothing of the prisoner.

It should be here stated, that the greater number of the facts of the case, as they came out on the trial, were unknown to Dr. Wilks and myself at the time of making our reports.

In reference to the questions concerning the *deceased woman*, my report to the Crown embraced the following conclusions:

1. That the deceased woman had died from a wound in the throat, dividing completely the carotid artery and internal jugular vein on the left side, as well as the windpipe in front.

2. That with such a severe wound as this, death would be almost instantaneous. The deceased would be at once rendered powerless to move or perform any act, not merely from the sudden loss of a large quantity of blood but from the retraction of the divided windpipe and the flow of blood into it.

3. That from the situation and direction of the wound, as described by Mr. Horton, it may be admitted as *possible* that the deceased could have produced it on herself, but in my opinion it is wholly improbable.

4. As to the *time of infliction* of the wound, Mr. Horton saw the body of deceased at 5.30 a.m., on the 24th July. He found the body "stiffened:"—"the body cold and stiff:"—"the arms were cold:" "the arms were becoming rigid as well as the legs," the body was becoming rigid, but not completely so. From these medical facts I infer that the deceased must have been dead at least two hours, and more probably from four to five hours at the time when Mr. Horton first saw the body.¹

The facts consistent with a suicidal infliction of the wound in the throat were, that the deceased woman was right-handed,—that the wound was situated on the left side of the neck, and

¹ See on this point a report of 100 cases in a paper "On the Cooling of the Human Body after Death" by Dr. Wilks and myself, published in the 'Guy's Hospital Reports' for October, 1863, page 181. The earliest case of rigidity with coldness comparable to the above, was about four hours. As to the alleged influence of death from sudden loss of blood on the rate of cooling and rigidity of the body, Case 27 furnishes an instance in point. A man died suddenly from the giving way of a ligature on the axillary artery. I saw the body four hours after death (in February, 1863), and there was a general warmth about it. The arms and legs were becoming cool, but there was no rigidity or stiffness in either. The arms and legs remained pliant until eight hours after death.

its direction was from above downwards and from left to right. Suicidal wounds in the throat by right-handed persons have commonly this situation and direction.

The facts considered to be inconsistent with a suicidal infliction of the wound and consistent with an act of homicide were as follows :—

1. The wound at its commencement on the far left of the neck, penetrating as by a stab perpendicularly towards the spine, the bones of which had been wounded or indented by the violence of the blow.

2. The position of the body of deceased, as described by Mr. Horton, furnishes the strongest evidence, either that this must have been an act of homicide or that the body must have been interfered with and actually laid out by some one before Mr. Horton saw it at 5.30 a.m. The hand of the deceased was under a chair, resting partly against the rail of the chair. Her death must have taken place so suddenly (from the nature of the wound) that she could not have placed the chair over her body after its infliction. She could not have inflicted such a wound as this while lying down with the chair placed over her head, nor is it conceivable that she could have fallen dead with the chair held in such a position. The circumstances are explicable only on the supposition that there had been interference with the body (by another) at the time the wound on the neck was inflicted, or subsequently.

3. When the great blood-vessels of the neck (carotid artery and internal jugular vein) are divided, death is not always or necessarily instantaneous, but the sudden and copious loss of blood (both arterial and venous) from such a wound prevents any muscular exertion or the performance of any voluntary act. When, however, in addition to the great blood-vessels above mentioned the windpipe is also completely divided, the cut end of this tube is either retracted into the soft parts or filled with blood, and in either case immediate suffocation results. No cry of alarm could have been uttered after such a division of the windpipe. Deceased could have performed no act after such a wound: she could neither have placed the chair over her body, rested her head against the rail beneath, nor have thrown the knife or placed it at a distance.¹

¹ The knife was not found near the body, but was taken from a table at some distance from it.

2. In reference to the condition of the *prisoner*, as described in the deposition of Mr. Dove, the following report was made.

The wound on the neck of Wiggins has all the characters of a self-inflicted wound, commencing on the left side, going in a direction from left to right, and from above downwards. It is superficial like all wounds self-inflicted and imputed to the acts of other persons. It involved only the skin and the external jugular vein, which is quite superficial. At the same time, it cannot be denied that such a wound as this might have been produced by the hand of another person favorably placed for the purpose. If the prisoner was, as he states, lying on his right side at the time he felt the cutting, it is hard to conceive how this wound, commencing on the left, could have been carried across the throat one inch or a little more beyond the middle line. He must have been roused by having his head turned round, or raised in order that the wound should have been thus carried round to the right, and there is no irregularity or indication of struggling or resistance to the cutting in this direction. The wound appears to have terminated here evenly, regularly, and so superficially, that in the middle of the throat it did not go through the skin. How the deceased could have produced such a wound on the prisoner's neck from left to right while, as he states, she was sitting behind him, does not appear easy of explanation. The description of the wound, as given by Mr. Dove, I think, clearly shows in accordance with his opinion, that it began on the left and terminated on the right side of the neck, the skin being there the farthest part divided or cut, and it was such a wound as the prisoner might easily have produced on himself.

As to the *time* at which *deceased* died the statement made by the prisoner is I believe wholly inconsistent with medical facts and experience. The body of the deceased was found at 5:30 a.m., in the state described by Mr. Horton, cold and rigid in the arms and legs. Prisoner states that he was called about 4 o'clock: he lay down again, and the deceased sat by him. After a time he felt a cutting about his throat: he struggled and got free. He went out of the house and on returning he found the deceased not dead but dying. If this were true the wound in deceased's throat must have been inflicted just as he entered the house again after giving an alarm. The body could not

have become cold and rigid, as found by Mr. Horton, in half an hour or three quarters of an hour. Therefore the prisoner's statement is not consistent with the facts.

3. In reference to the articles of dress taken from the prisoner.

1. Blood was found in a dry and coagulated state on a flannel shirt, cotton shirt, guernsey, jacket, and trousers.

2. That, under the circumstances, it would be impossible to say whether the blood was venous or arterial, or a mixture of the two.¹

3. That the blood on the three shirts, as well as on the inside of the red cotton neck-handkerchief, if worn, may be accounted for by the wound on the left side of the prisoner's neck. That the bloodstains found on the front of the trousers may also have been produced by blood escaping from the wound when the prisoner was in the erect posture.

4. That there was dried and coagulated blood, with dirt on the soles of both stockings, as if the person wearing them had trodden in wet blood which had afterwards dried.

5. That there was a small quantity of blood and dirt on the soles of the boots outside; none on the front of the boots, nor so far as could be seen on the inside. A portion of leather scraped from the inside of both boots at the part corresponding to the tread of the heel, gave only a mere trace of blood. There was no mark or indication of staining on the inside. There was one round spot of coagulated blood low down on the instep of one of the stockings, showing that this part had not been covered with a boot or shoe when the stain of blood was produced upon it.

Two articles were specially examined, which were considered to furnish evidence in support of the charge against the prisoner, namely, (1) a red cotton neck-handkerchief, and (2) a common table-knife with a wooden handle.

The handkerchief was removed from prisoner's neck by Mr.

¹ The bleeding from the prisoner was only venous; that from the deceased was both arterial and venous. The great difference in the two cases would have been in *quantity*. If the prisoner's statements were correct, the only wound to account for the large quantity of blood found in different parts of the room and on his own clothes, must have been those on his own neck, which involved merely the external jugular vein. The blood from this, however, had chiefly flowed or trickled down on the inside of his flannel jacket and cotton shirt.

Bathurst Dove, who saw the prisoner about two or three hours after the alarm was given. As its appearance was remarkable, a minute examination of it was made before the trial. It was fitted to the shirt with articles of the diameter of a man's neck, in order to determine how it was worn in reference to the situation of a deep cut in one border and the marks of blood found upon it.

The handkerchief was of thin red cotton, folded in sixteen layers, so that it was very thick at the edge or border, and about three inches wide. It was long enough to be worn twice round the neck. The prisoner had stated that when the attack was made upon his throat, he wore this handkerchief, and that the cut found upon it was owing to its having been cut in the attempt to wound his throat.

There was a large patch of dry coagulated blood, of the size of the palm of the hand, on the part of the handkerchief which had been applied to the wound in his neck. At some distance from this point, and on the opposite side, there was an oblique cut commencing at the thick folded edge of the handkerchief, and dividing nearly two thirds of its substance. Sixteen folds or layers of cotton had been divided by this cut. The edges of these folds were clean and sharply cut, and neither stained nor stiffened. Hence there could not have been any wet blood on the knife used for cutting it. The inner and outer layers of the handkerchief were much spotted or sprinkled with small spots of blood which had dried on the stuff and stiffened it. These were most numerous towards the ends of the handkerchief. One of these spots on the situation of the cut, when examined by a lens, presented an appearance as if it had been cut through with the folds after it was dry. There was no blood mark on the layer beneath, nor any diffusion as of wet blood in the cut fibres of the handkerchief.

Looking at the situation and direction of the cut in the handkerchief, and comparing it with the large patch of blood inside, and the situation of the wound on the left side of the prisoner's neck, I inferred (1) that it was not made at the time that the wound was inflicted on the prisoner's neck, or the blood effused from that wound would have probably stained the divided portions deeply. (2) That it was made with a weapon or instrument not stained with wet blood. (3) That it might have been

made while the handkerchief was on the neck, but then, as it was cut on the thick folded edge across the layers and not in front parallel with them, the handkerchief for this purpose must have been pulled forwards so as to give room for the use of a knife. The sharp edge of the knife must then have been used at a right angle to the throat. (4) That the cut might have been made through the folds when the handkerchief was off the neck; the direction and appearances of the cut through the folds would then admit of an easy explanation. Under any circumstances, sixteen layers of cotton could hardly have been cut through with a knife without the employment of considerable force. The cut in the handkerchief was not in the situation of the wound on the left of the prisoner's neck, or its folds could not possibly have escaped staining with blood. On the other hand, such a cutting of the handkerchief, when on the right side of the neck, could not have taken place in an act of attempted murder without producing some wound or injury of the neck to the effusion of blood. This would have stained the folds, or at least the shirt-collar; but there was no wound in this situation, and the shirt-collar, although cut in a fold near the button for about half an inch, presented no appearance of blood. (5) Assuming that the handkerchief was on the neck at the time the folded edge was cut,—the cutting may have taken place from above downwards, or from below upwards, according to the way in which the handkerchief was worn, having regard to the situation of the patch of coagulated blood and of the wound in the prisoner's neck.¹

¹ There is a circumstance which appears to show that the handkerchief was not on the prisoner's neck at the time of the occurrence. There were numerous small spots of blood both on the inside and outside. There was no great stain of blood except in the part which had been used for covering the wound. The shirt-collar, especially on the left side, was not spotted but deeply stained both inside and outside by the flow of blood from the divided external jugular, which had coagulated on the fibre. The handkerchief, if really worn by prisoner at this time, must, therefore, have covered the deeply-stained shirt-collar without receiving any corresponding mark of blood from it. Another fact noticed was that while the left side of the collar with the button-hole was saturated with blood, the right side of the collar with the button presented no mark of blood. The shirt could not, therefore, have been buttoned at the time the bleeding from the jugular took place, nor is it easy to understand how the handkerchief could have been on the neck without bringing into close contact both sides of the collar, and thus causing a general staining of the whole. If, when the jugular vein in the

A table-knife was found in the room, which was covered with blood on both sides of the blade. The whole width of the blade had blood upon it, showing that it had penetrated deeply, and there was a fringe of dry coagulum near the back. This proved that it must have been completely buried in the wound. The knife had a rounded sharp end, and the cutting edge was sharp. The wounds in the neck of deceased and prisoner might have been produced by it. There was some blood where the spike entered the wooden handle; but the handle was examined microscopically and chemically, and no trace of blood could be detected upon it. It was a wooden handle, and presented an appearance as if it had been scraped.

At the trial of the prisoner for the murder of his wife at the Central Criminal Court, the following evidence was given:¹

Mr. James Horton, surgeon, of Stepney, deposed that on the 24th of July he was fetched to the prisoner's house at about 5.30 a.m. He went upstairs into a bedroom, and found the deceased lying on the floor on her back, with her head to the wall, her feet extending towards the door, and her arms outstretched; one arm was resting on the hearthrug. A sheet was thrown over the body, which was clothed in a shift; the head was lying on a pillow and some other things, and the back of the head was resting against the rail of a chair.² In the throat was an extensive wound extending from about two inches below the left ear in a semicircular shape, to about an inch beyond the

prisoner's neck was wounded, the handkerchief was not round his neck and the shirt-collar was open, this would at once explain the peculiar disposition of the blood. Another fact is also worthy of note. As both sides of the handkerchief were spotted with blood, if it had been tied round the neck when the jugular vein was wounded, how could the spots have been produced on the inside without the right side of the shirt-collar becoming, at the same time, spotted in the corresponding part. There appears to me to be no reasonable explanation of these facts, except on the theory that at the time the wound was inflicted on the prisoner's neck the handkerchief was not round his neck, and the shirt-collar was open.

¹ From notes taken at the trial and from the 'Central Criminal Court Sessions Paper,' vol. 66, pt. 395, October, 1867, p. 523.

² The rail was in the centre of the under part of the chair, so that the head was under the chair. Beneath the pillow on which the head was partly resting was a folded reefing-jacket belonging to the prisoner, and beneath this was a woman's net-cap. There was a good deal of blood on the seat of the chair; this was firmly coagulated, but not dry like that on the floor. It was covered over with a black handkerchief or apron.

windpipe on the right side. It was about five inches in length. It had a jagged appearance, and there were two slight incisions running into the main wounds, one above and the other below, on the left side of the throat, each about half an inch long; these wounds were not deep, but the chief wound was two inches and a half in depth. This wound had divided the sternomastoid and omo-hyoid muscles, with the external jugular vein; it had penetrated to the spine, dividing on the left side the common carotid artery, the internal jugular vein, and the par vagum. It extended on the right side an inch beyond the trachea, which was completely divided. The spinal column had been penetrated by the weapon on the left side in about the situation of the fourth cervical vertebra. There was a penetrating wound on the front of the vertebra as if produced by a stab.

The witness stated that a wound of this kind would produce death very quickly, within a minute probably,—the windpipe being divided the person could not call out. It was possible that *such a wound could have been inflicted by the deceased upon herself* in a state of extreme excitement amounting to frenzy. It would have required a great degree of strength and force to inflict it—such force as frenzy would give.

The other circumstances noticed by the witness were: The blood in the throat was dark coloured and coagulated; there was a good deal of blood on the *shift*; *it was dry*. There was blood on the corner of the hearth-rug, and blood had been spurted on the lower part of the wall near the fire-place. There were several large spots—some of them were larger than a shilling: they were dry. There was a considerable quantity of dry blood on the floor; there was also a good deal of blood, in a dry state, extending into the corners by the door. There was no liquid blood upon the floor; the blood was not dry on the hearth-rug, but all on the boards was dry. A knife (a common table knife with a rounded but somewhat sharp end) was shown to him by the constable. There was blood on the blade of it, which was then dry; he did not observe whether there was any blood on the handle.

He examined the legs and feet of the deceased, and felt them from the toes up beyond the knees; they were cold and were becoming rigid. He turned back the sheet and chemise and found the abdomen warm. The arms were outstretched, cold,

and becoming rigid. The hands were covered with blood, back and front; there was a good deal of blood on them, *smear*ed; it was dry and as if in streaks. From the state of the body and the appearances, generally, he thought that death had taken place at least *two hours* before he saw it.¹

With respect to the condition of the prisoner, the witness stated that he saw him first about the time mentioned (5.30 a.m.) a few minutes before he saw the deceased. He was in the street sitting in a chair. He had a red handkerchief round his neck. Witness pulled it away and looked at the wound in the prisoner's neck; this was superficial, and about two inches long. The external jugular vein was divided, but in witness's opinion prisoner had not lost a great deal of blood. There was blood on that portion of the handkerchief which was opposite to the wound, and the wound bled rather freely when the handkerchief was pulled away. There was no difficulty, however, in stopping the bleeding. Seeing that the wound was not dangerous he left the prisoner sitting in the street, and then went upstairs to see the deceased.

The prisoner was subsequently placed under the care of Mr. Bathurst Dove of the London Hospital. He was brought to the hospital between 7 and 8 a.m. on the morning of the 24th July; and the following is the substance of the evidence given by that gentleman at the trial respecting the prisoner's condition. The prisoner was dressed, and wore round his neck a red cotton handkerchief (produced). There was a large mass of blood on

¹ In cross-examination by counsel for prisoner, the witness was asked whether he had not said at the coroner's inquest, "I think the deceased must have been dead one hour: it might be more." This question was put in order to show that he had changed his opinion at the time respecting the time of death, but the witness gave a satisfactory explanation of the apparent discrepancy. What he said at the inquest was simply an answer to a sort of leading question put by the coroner. "The coroner asked me whether she might have been dead an hour, and I said 'Yes—an hour; it might be more.'" It is so much the custom at a trial for murder to insist upon rigorous accuracy between the medical evidence then given and that previously given at an inquest or magisterial investigation, that medical witnesses cannot be too much on their guard against the effect of answers made by them to *leading questions*. The views of the coroner or magistrate may be afterwards fixed upon the medical men by the answer yes or no to questions thus put. A witness is bound to answer the question as put, but when it is thus framed in a leading form, any theory involved in it should not be fastened on the surgeon as if it had originated with him.

it, corresponding to a wound on his throat. The wound was on the left side, an inch and a half below the left ear, and a little behind. It extended across the throat to about an inch past the middle on the right side; it went through the skin and the tissue immediately beneath the skin on the left side, and as it passed forward round the throat it became very superficial, so that in the middle of the throat it did not go through the skin. The external jugular vein was divided a little nearer the extremity than the middle of the wound; it was not dangerous under proper care. Witness believed that it was inflicted from left to right, and that the prisoner could have inflicted it upon himself. There were two slighter superficial wounds on the skin, between this wound and the lower jaw, and there were some slight superficial scratches about the angle of the jaw on the left side. On his left thumb, there was a superficial cut on the palmar surface. The wound was healed in a few days.

The red cotton handkerchief (produced) was taken from his neck on admission. It was in the same state then, with the exception of the blood (from the wound in the neck) being dry. He noticed that it was cut through a number of folds before it was taken from the prisoner. There were sixteen folds or layers of the handkerchief which had been cut through. There are one or two small spots of blood on the edge of the cuts, not penetrating more than one fold; all the rest are clean. The instrument which inflicted the wound in the neck must have been bloody, and he should have expected to find blood on the handkerchief. If the knife had commenced with making the wound, the wound must have bled immediately, and if the part where the handkerchief was cut was against that part of the throat which was wounded, he would have expected to find a considerable quantity of blood on the handkerchief. He further stated that the cut in the handkerchief, when he took it off, was not in the vicinity of the wound, but on the opposite right side of the neck. The prisoner told him that he had put on the handkerchief tighter in order to stop the bleeding. Witness admitted in cross-examination, that when before the magistrate, he had said (in answer to a question) that there was no circumstance connected with the wound on the prisoner's neck, which would lead him to discover whether the wound was inflicted by the prisoner or by another person, the appearances would be the

same. This witness did not see the body of the deceased Agnes Oaks.

In reference to the power of locomotion, Mr. Dove said that a minute would be an extreme time for the power of locomotion to continue in the deceased Agnes Oaks, supposing the wound to have been self-inflicted. He thought syncope would follow in a shorter time than a minute from the loss of blood from the carotid artery. A long extract was then read to witness from 'Taylor's Principles and Practice of Medical Jurisprudence,' p. 513, on the survivorship of persons after wounds in the throat, and the retention of a power of locomotion. Mr. Dove agreed generally in the opinion that death was not always instantaneous under such wounds, and that a person had been able to run some distance after a wound of the carotid artery.

The evidence which I gave at the trial was based substantially on the report. In reference to the wound on the neck of deceased, I agreed with Mr. Horton that a person in a state of frenzy or delirium might have inflicted such a wound upon herself. Assuming that the wound was inflicted by deceased upon herself, the injury to the bone of the neck was probably done first, *i. e.* that the wound began on the left side with a stab reaching to the spinal column, and afterwards extended in a semilunar form to the right side, dividing the carotid artery, jugular vein, and windpipe. If the wound had commenced on the right, the deceased, after a division of these great vessels, would not have had power to produce the stab or cut in the cervical vertebræ. After the infliction of such a wound, the deceased might have had the power of motion to some slight extent, but death would have followed such a wound as that within a very few seconds.

Assuming Mr. Horton's description of the state of the body to be correct, and considering the age of the woman (22), and the time of year, the deceased could not have been dead less than two hours when he first saw her, and it might be a longer period,—from three to five hours. This refers to a person dying suddenly in a state of health, and in the prime of life, the body retaining its natural warmth up to the time at which death took place; the season of the year was favorable to the retention of warmth, and there was nothing to accelerate

the condition of rigidity. The loss of blood as the cause of death does not affect the rate of cooling of the body. This depends on its temperature at the time of death, and the temperature of the air to which it is subsequently exposed. Applying my judgment to this particular case, *i.e.*, of a woman in good bodily health dying suddenly, it would take from three to five hours for the body to become cold and rigid in the arms and legs, the abdomen at the same time retaining its warmth. A person dying under such circumstances (from such a wound) might have the power of motion to some extent, but she would not have sufficient muscular power to move a chair, or use any exertion beyond running for a few yards before falling.

In reference to the red neck-handkerchief, it was stated that from the nature of the cut through the thick edge or border, and from the number of folds divided, some appearance should have been seen on the skin of the neck that a knife had been so used. On this a question was put by the Court,—whether the power of the person using the knife for this purpose might not have been exhausted by so many folds, that when it reached the skin it only grazed it?¹

It was stated in reply, that if the handkerchief was, at the time, worn round the neck, it was impossible to see how the knife could have been used to produce such a cut in the border without cutting the neck. Such a cut could not have been produced in the handkerchief while worn, without causing some sort of wound in the neck. The facts could only be explained by supposing that the cut in the handkerchief was made when it was off the neck, or, assuming it to have been worn, it must have been pulled some distance from the neck, in order to give the knife that free and firm movement which was necessary to the act of cutting through so many folds of cotton. A plunge of the knife strong enough to have severed these folds, while the handkerchief was worn close to the neck, would have penetrated the throat deeply enough to draw blood, and thus to stain the cut folds as well as leaving wounds in the neck. It was further stated in reply to questions, that this cut

¹ This question, it will be seen, rather applies to the cutting of the handkerchief horizontally with the cutting edge of the knife parallel to the width of the neck and not at right angles to it—a condition necessary to produce such a cut as was found upon the handkerchief.

in the handkerchief did not in any way correspond to the wound in the prisoner's throat, and it was not such a cut as would be produced by drawing a knife horizontally across the throat in the attempt to cut it. There was a cut in the collar of the shirt, but no blood upon it either inside or outside. The stockings were stained in the soles with dried and clotted blood, so that they were quite stiff with blood and dirt; the boots had no corresponding marks of blood inside. The blade of the table-knife had blood on both sides, but there was no blood on the handle. The cross-examination was directed to show that the stocking soles might have been made bloody by the prisoner walking on a bloody floor, and that this blood might be rapidly dried by his subsequently walking on a dusty or dry floor. If the boots were put on after a good deal of walking there might only be a trace of blood left inside the boots.

In reference to the opinion given by me on the rapidity with which death would be likely to follow from such a wound as that found on the body of deceased, and the loss of power of motion or of making voluntary exertion, the learned council read the following extract from the 'Principles and Practice of Medical Jurisprudence,' 1865, p. 513, and requested special attention to it. This was the extract which had been read by the learned counsel to Mr. Dove in his cross-examination:—

"Wounds of the carotid arteries are often pronounced *instantaneously* mortal. A witness may deliberately state that the person could not possibly have survived an instant. This is a very hazardous opinion, for it occasionally comes out on inquiry that if such a wound had been instantaneously mortal, then, in defiance of rational probability or of the strongest presumptive evidence to the contrary, the deceased must have been murdered. A medical opinion of this kind has been not only refuted by circumstances, but by the evidence of eye-witnesses. A medical witness is then compelled to admit that his rules for judging of the mortality of wounds are wrong, and that the person may have survived for a longer or shorter period. There are several cases on record which show that wounds involving the common carotid artery and its branches, as well as the internal jugular vein, do not prevent a person from exercising voluntary power and even running for a certain distance. Mr. Clegg, coroner for Boston, informed me that in

1863 he held an inquest on the body of a man who committed suicide by cutting his throat; the common carotid artery and jugular vein were cut through to the bone, and in spite of the loss of a large quantity of blood, the man lived half-an-hour. In a case of murder perpetrated at Kingston, in March, 1861, it was proved by medical evidence that the deceased died from a wound in the throat which cut through the right carotid artery, jugular vein and the windpipe. The wound had been inflicted while deceased was lying in bed. Her body was found in an adjoining room, and the circumstances showed that after receiving the wound she had been able to rise from her bed and to stagger or run to the distance of about six feet. In *Reg. v Danks*, Warwick Lent Assizes, 1832, it was proved that deceased had died from a wound in the throat inflicted by the prisoner, which divided the trunk of the carotid artery, the principal branches of the external carotid, and the jugular veins. The evidence rendered it probable if not certain that after the infliction of this wound, the deceased had been able to run twenty-three yards and climb over a gate, the time required for the performance of such acts being at least from fifteen to twenty seconds. Most medical witnesses would have probably given an opinion that the deceased could not have moved from the spot where such a wound had been inflicted, but it was clear that she had gone this distance. There was no dragging of the body and no motive for its being dragged by the prisoner and exposed in an open road where it was found. Such cases as these show the necessity of caution in giving an opinion respecting immediate death from wounds. When the internal jugular has been the principal vessel involved in a wound, a similar question has presented itself. The power of moving has been exerted to a considerable extent."

"Q. by Counsel.—That was written by you in 1865."

"A.—Yes; I adhere to it now."

In reference to Mr. Clegg's case quoted in the above extract it was stated in answer to a question that the windpipe was not severed—that the power of motion depended upon the number and importance of the parts involved in the wound—and that each case must be judged by its own special conditions. When the trunk of the carotid artery is cut through, a person seldom survives above a few seconds, and when the windpipe is

at the same time divided, the gush of blood generally fills the open ends, and the person is suffocated even if he does not fall into a fatal syncope from the sudden loss of blood. When the jugular vein, carotid artery, and windpipe are severed death would be generally instantaneous. One instance is recorded in the extract read in which a person so wounded survived sufficiently long to be able to move about two yards from the bed and she was there found dead. As a rule, when the windpipe is severed, the voice is lost whether the carotid artery and jugular vein are cut through or not. In some cases (referred to in the extract) the windpipe was not wounded, and in others the carotid artery escaped.

"*Court.* Q.—You say that the injury to the bone (the vertebræ) was done first—might not the knife have been plunged into the neck with such violence as to reach the bone?

"A.—The injury (to the bone) was in a different situation as I gather (from the severed blood-vessels and windpipe). The first plunge of the knife might have been done with such force as to injure the bone and the vessels afterwards divided. A person in a state of frenzy and delirium, in which there is unnatural strength, might produce such a wound on the neck by a sudden and violent plunge. There have been cases of self-inflicted wounds dividing the large blood-vessels of the neck and the windpipe, and reaching to the spine just grazing the spinal ligaments; but in these a razor or sharp cutting instrument has been used; this has been drawn rapidly and with great force across the lower part of the throat. In the case of deceased the injury to the bone was produced by stabbing or plunging. In cases of suicide, wounds are often of a very fearful character, but they do not commonly involve the spinal column and the great blood-vessels at the same time.¹"

¹ The wound in the neck of the deceased is unlike that of any suicide which I have heard or read of, and in the kind of injury to the spine it resembled those cases of murder which I have been required to investigate in which death was caused by cutting the throat. Mr. Horton described the wound as "jagged:" it was very deep and had the appearance as if a knife had been turned in it. This is totally unlike those rare cases of suicidal wounds in which the anterior ligaments of the spine have been just reached or grazed by a rapid drawing of a sharp razor or knife through the soft parts of the neck. Nothing is more common than to read in newspapers of the throat being cut "from ear to ear," or the "head being nearly severed from the body." These cases collapse commonly on

Dr. Wilks stated that he had given special attention to the changes which the human body underwent after death. Assuming Mr. Horton's statement of facts to be correct, he believed that deceased had been dead two or three hours at the time of his examination, and two or three hours would be rather under the mark. In forming that opinion he made allowance for the loss of blood and for all the circumstances described. He formed his conclusion of two or three hours because he could not call to mind any case in which he had seen rigidity (*rigor mortis*) occur under three hours.

He had heard Mr. Horton's description of the wound in the throat; it was barely possible for the woman to have inflicted that wound upon herself. He had seen an equally severe wound produced by suicide on a man, but had never seen it in a woman.

This was the whole of the *medical* evidence in reference to the two principal questions—whether the wound in the deceased was an act of suicide or homicide and the time at which it was probably inflicted. It will be perceived that all the medical witnesses admitted that such a wound, although of an unusual kind for suicide, might have been produced by the deceased on herself—that from such a wound death might not be instantaneous, but the person might survive a few seconds and have the power of moving or throwing herself forward a few yards from the spot where the wound was inflicted. That she would be able to struggle or make any strong exertion, such as by placing a chair over her head, after such a wound, was denied and pronounced to be inconsistent with all medical experience of such wounds.

The sister of the deceased woman proved that she (deceased) was twenty-two years of age and had lived with prisoner as his wife for about six months. They quarrelled, and a week before her death she said she would leave him and would not live with him any longer. It was further proved that three days before her death he had brutally illused her, and was seen holding her by the hair and kicking her on the back of the

investigation into wounds involving the pharynx, larynx, and branches of the external carotid artery. They give a sensational interest to the respective cases, but they add nothing to our information on acts of locomotion, &c., after wounds involving the main blood-vessels of the neck.

head and under the blade-bone. The deceased said she would leave him and go again into service. To another witness prisoner said on the night of the 23rd (the day before her death) that he was determined to get rid of her, as she had not turned out what he expected.

One witness, a neighbour, deposed that on the night of the 24th July, at 10 minutes to 2 a.m., she heard screams of murder proceeding from the direction of the prisoner's house. A policeman on duty on the same night heard a cry of murder; it was from the direction of the prisoner's house; it was a female voice, and the cry of a person in great distress. The sound died away; soon afterwards a church clock struck 2 (2 a.m. of the 24th). A third witness, a woman living close to the prisoner's cottage, while attending her husband, who was ill in bed, on Wednesday morning, the 24th July, heard cries of murder proceeding from the direction of the prisoner's wall, but she could not say whether it was a woman's voice or a man's. It was 10 minutes to 2 a.m. by her clock, as she was then going to give her husband some medicine. At a later period she was again alarmed by a cry of murder; this was at 10 minutes to 5 a.m. on the same morning.¹ On this second occasion the cry was from old Mr. Wiggins (father of the prisoner). He came into her house. At the same time she saw the prisoner standing in the street opposite. He was dressed in a guernsey, and had his hands up to his neck. A chair was fetched and he sat down on it in the street.¹ He had his boots on.

The husband of this witness corroborated her evidence as to the cry of murder at or about 5 o'clock a.m. He looked out and saw prisoner's mother. She called out "murder" two or three times and then walked in again. She had her gown on, and was not in her night-dress. She held a longish knife, in her hand, but he could see nothing about her hands or the knife as it was too dark. Prisoner's father then came out; he clapped his hands and said, "Well, this is a sight;" he then went in, and after a little time prisoner came out. It might be *ten or fifteen minutes* from the time the old woman came out till prisoner came out; his wife awoke when prisoner came out,

¹ It should be stated that the only persons in the prisoner's house at the time of this transaction were Mr. and Mrs. Wiggins, the father and mother of prisoner, the accused Wiggins, and the deceased Agnes Oaks.

and about 5 o'clock they both saw him from the window sitting in a chair in the street. Another witness, W. Dunn, living by the side of prisoner's cottage, heard cries of murder on the morning of the 24th July, at about 10 minutes to 5 o'clock. He saw the prisoner's father in his shirt, and the prisoner going towards his cottage (he had been to call a neighbour). He asked what was the matter. Prisoner said, "She has been and cut her throat and cut mine too; for God's sake come down and see what is the matter." This witness was the first person to enter the room where deceased's body was lying.¹

The prisoner was standing opposite the deceased alongside the table with a knife in his hand. One part of the body was on the hearthrug, another on the floor. Her head was under a chair within seven inches of the wall of the room, resting on a pillow, which was at the back of the neck, and it (the head) hung so far back that he could not at first see her face. She was not quite on her back, but a little more on her left side. The underneath rail of the chair touched her chin. Under the pillow on which the head was lying there was a jacket with a handkerchief on it. This was the prisoner's jacket which he wore the day previously. Deceased's throat was much cut; her shift was *torn down in front to within a foot from the bottom*, and the front of it where the tear was was covered with blood. He tried to ease her face from the chair.² The witness felt one leg about the shin, and it was cold. He felt the chest about the heart, and found it loo-warm (lukewarm); there was no beating. The prisoner was standing opposite the deceased, by her feet; he had the knife (the table-knife produced in evidence) in his hand; he put it on the table. Witness said, "Jack, for God's sake what have you been doing of?" He said, "Bill, she done it herself, and this is what she done it with:" he then put the knife on the table and walked out. There was wet blood on the knife.³

¹ This must have been at or a little before 5 o'clock, *i.e.* about half an hour before the body was seen by Mr. Horton; and if the prisoner's statement was true, the deceased must have only just before inflicted the wound on her own throat.

² This may account for the slightly different position in which the head was afterwards found by Mr. Horton in respect to the under rail of the chair.

³ The blood on this knife was quite dry when seen by Mr. Horton, twenty minutes afterwards, but, according to the theory of the prosecution, the prisoner may have used this knife for producing the wound on his own throat, and it is

There was blood about the room, but whether wet or dry witness did not notice. There was no blood on the bed or bed-clothes. There was blood on the seat of the chair found over the head of deceased, and a black apron partly covered it. Witness went for a constable, and on returning found the prisoner sitting on a chair in the street. The body was as he had left it, with a sheet placed over it, which he had taken from the bed for the purpose. A woman who lived with this witness corroborated his evidence. At about 5 or 10 minutes to 5 o'clock she looked out of the window and saw the prisoner and his father in the street. The prisoner had on brown cloth trousers, a blue guernsey, a red neck-handkerchief, and a pair of boots. He was crying out murder, with his hands to his throat, and his father was standing in his night-clothes crying out "murder." Witness followed her husband into prisoner's house; saw prisoner's mother at the top of the stairs in her night-clothes, doing nothing. She saw deceased lying on the floor with her head under a chair—the rail of the chair had caught underneath her chin; there was a pillow between her shoulders, more under her shoulders than her head—she was lying on it. Deceased's throat was cut; she had on her shift, which was very much torn down the front to within a short distance of the bottom. She felt her feet and legs, both feet and one knee, and they were cold. She thought from *five to ten minutes* had passed between the time she saw the prisoner in the street crying murder and the time she felt the deceased's legs. There was a considerable quantity of congealed blood on the chair. There was a black handkerchief or apron on the chair. Witness helped to dress Mrs. Wiggins, prisoner's mother; her bedroom was on the same floor as where the dead body was lying. There was blood on her hands, and more on one hand than the other.

The witness stated that the old woman had no boots on, only stockings, and there was blood on the tops and bottoms of the feet, looking more dry than wet. She had on her night

assumed that this was inflicted shortly before the cry of murder was raised which brought the witnesses to the house at or about 5 o'clock. The theory for the defence required that the wound in the deceased's throat must have been produced after the wound in the prisoner's throat—in short, after the prisoner was seen in the street at 10 minutes to 5.

clothes, but she did not notice any blood upon them. There were blood-marks on the stairs looking like footmarks. She had been there nearly half an hour when Mr. Horton came. She assisted in placing the body of the deceased on the bed; the shift was still on it at this time.

A man of the name of Williams, living near, deposed that on the morning of the 24th July, about 1 o'clock, he saw prisoner going towards his house with a beer-can in his hand. He did not appear sober, and about a quarter to 5 in the morning he heard cries of "murder." Looking out of the window he saw the prisoner's father standing in the street and calling out. Soon after he saw prisoner walking towards his own house on the opposite side of the way. He was dressed. Asked what was the matter. He said, "Oh, my throat! my throat!" Witness again said, "What is the matter?" Prisoner said, "Oh, the knife! the knife! my wife has cut my throat and her own too." He got a chair and placed him on it. About half an hour had elapsed from the time he heard the cries of murder until Mr. Horton, the surgeon, came.

Another witness (Atwood) said that about 5 o'clock on Wednesday morning, July 24th, he heard a cry of murder, and saw the witness Dunn running. It might be then about a quarter past 5; he saw the prisoner standing against the fence supported by some one, and said, "Good God! what is the matter with you?" He said, "My wife has cut my throat, and she has cut hers, and she is dead. I put my hand up to my neck and found the blood running; I went into my father's room to have the blood stopped. I tied a handkerchief round my neck and went back into my own room, and *then I saw my wife sawing at her own neck.*"

Burmister, a policeman, deposed that he was fetched by Dunn about 5.30 a.m. on the morning of the 24th July; saw the prisoner standing against the railings, a few yards from his own cottage. He was dressed and had his boots on. There was blood on his neck, but not a great deal. He had his handkerchief on. There was blood on his handkerchief and shirt. Saw in the room the body of deceased, lying covered with a sheet; noticed that her shift was torn; felt her right hand, it was cold; felt both feet, they were cold. There was blood on her shift, but did not notice whether it was wet or dry.

Deceased's head was under the cross stock of the chair; the head was resting on the rail—the forehead part; he meant under it more than against it. Saw a knife on the table (the table-knife already produced), of which he took possession; there was blood on it, but could not say whether it was wet or dry. Mr. Horton came ten minutes after he had gone into the room. There were footmarks of blood on every step of the stairs. He took the prisoner to the London Hospital. He said to him, "It is she who has done this, and she asked me to forgive her and I would not forgive her, because she had such nasty dirty ways with her; and because I would not forgive her she has done this. I was lying on the hearth-rug dozing, and she laid hold of me with her left hand and was sawing away with the knife in her right hand. I put up my hand to save myself," and he then pointed to a small cut on his left thumb. "I got away from her by some means and ran into the adjoining room and called father and mother up, and when I returned she had cut her own throat and had the point of the knife in her throat in the act of turning it round."

This completes the general evidence for the prosecution. The cross-examination of the witnesses was chiefly directed to show that they might have been mistaken as to the time and the direction in which they traced cries of murder; that such cries at night in the streets of this locality were not unusual; but none of the main points which related to the question of murder were at all weakened. It had been announced on the first day of the trial that witnesses, including the father and mother, would be called for the defence, but, for some unexplained reason, the counsel for the prisoner declined to call them. It is obvious that if any persons could have thrown a light upon the circumstances which appeared to press strongly against the prisoner, and have given a reasonable explanation of the facts, the father and mother, sleeping on the same floor, in an adjoining room, were those persons. The circumstances under which they were first aroused on that night, the time at which they first heard cries of murder, the time at which they first saw prisoner and deceased with the wounds in their throats, and how it happened that there was a quantity of blood upon the hands of the mother and on her stocking-soles,—were facts which might have been elucidated by a close examination of these persons in the absence

of each other. Had they been called as witnesses, some explanation might have been given of the large quantity of dry blood found by Mr. Horton over the floor, on the walls of the room, the hearthrug, and under the seat of the chair; the tearing of the bloody shift of deceased, and the singular position in which her dead body was found, might also have been explained. It is only reasonable to suppose that if the father and mother could have thrown any light upon these facts consistent in the remotest degree with the prisoner's non-complicity in the act, the learned counsel for the prisoner would not have hesitated to call them. But with a full knowledge of the evidence which they had it in their power to give, he declined to put them into the witness-box, and, no doubt, therein acted with proper discretion for the interests of the prisoner. If it was not in their power to rebut or explain the leading facts which inculpated the prisoner, their evidence might have seriously damaged his case by confirming the evidence of the witnesses for the prosecution. One witness only was called for the defence, namely, the sister-in-law of the prisoner. She did not see the body of deceased until about 7.30 on the morning of the 24th of July. In laying her out on Thursday morning, July 25th, she tore her shift, *i.e.* the bloody shift found on the body of deceased. She was forced to tear it to get out the right arm, because she could not raise the weight of the body. She tore it down the middle nearly to the bottom; there was no other tear in it that she noticed. This statement was subsequently a little modified by the admission that she thought it was already torn in front, but she tore it more to get it off.¹

The prisoner himself was not so reticent. [In addition to the

¹ Dunn and his wife, and the policeman Burmister, who saw the dead body at least two hours before this woman, all deposed to the fact that the bloody shift was then torn down the front to within a foot of the bottom. The edges of the torn part, so far as I could perceive when the shift was produced, were saturated with blood as if wet blood had come in contact with them after tearing. A tear through a shift on which the blood had dried twenty-four hours after death would have presented a different appearance. The woman may have torn the shift a little more on the Thursday, but, in the face of the evidence already given by three witnesses and unimpeached, the court and jury were not likely to place the least confidence in this statement. There was a desire, if possible, to get rid of this evidence of a mortal struggle or resistance on the part of the deceased; but as it failed, its effect was rather against the prisoner. The tearing of the shift did not fit into any of the statements which the prisoner had made.

three short statements reported in the general evidence, he made three others in a more detached form—one to the surgeon, Mr. Bathurst Dove, one to the coroner, Mr. Richards, and a third to the Court after the jury had returned their verdict. To Mr. Bathurst Dove on the morning of the 24th of July, and only a few hours after the occurrence, he made the following statement :

“He returned home late the previous night, and asked his mother to call him in the morning, and had then gone into his room ; and, as he had to go out early, he did not go to bed, but lay down on the hearthrug before the fireplace. His mother called him in the morning ; he got up, and finding it too early to get out (four o'clock), lay down again, and the woman he was living with came and sat by him and asked him to forgive her. He refused to do so, and turned on his right side with his face towards the fireplace, and went to sleep. That she was sitting behind him, and promised to call him, and the next thing he became conscious of was some one at his throat, and he found it was the woman ; that her left hand was on him, and that she was using the knife with her right hand ; that he struggled away from her, and gave the alarm to his parents, and then went out into the street to find a neighbour, but, finding him too drunk to come, he returned to the house, went back into the room, and then the woman was dead or just dying.”

The second statement was made on oath before the coroner, and was to the following effect :

“I went home at a quarter to one on Wednesday morning the 24th of July. I knocked at the door with some beer. Deceased let me in, and I went up stairs. I spoke to mother to call me. I went into the room ; Agnes (the deceased) was in bed. I asked her if she would take the beer ; she said, ‘No.’ I drank half the beer and ate some supper—kidney and bread. I pulled off my shoes, and lay down in front of the fireplace. I said, ‘I shall not come to bed, as I want to get up in the morning.’ I put a reefing jacket under my head and went to sleep. My mother called me about four o'clock ; I went again to sleep. I awoke again, and went down stairs to look at the clock ; it was twenty minutes past four by the clock. She said, ‘It is a quarter past.’ She said, ‘Lie down again.’ She sat alongside of me as I lay on the hearthrug. She said, ‘Oh, Jack, do

forgive me, and I will tell you all I've done with the money.' I said, 'I can't forgive you, Agnes.' She said, 'Oh, do.' I turned with my face to the fireplace and went to sleep. I was awake by something tickling my throat; she had her hand fast hold of my throat; I tried to scream, but could not. I put my left hand up, and got my thumb cut; after a bit she let go of me, and I got up and went into the next room to my father and mother, and told them Agnes had cut my throat. I went down stairs and mother went into the room. Mother had called out and said, 'Agnes has cut her own throat.' I went up stairs, and found her sitting in the corner of my room near my reefing jacket; the knife was by her side. I picked it up; it was the same as I had used for my supper. Her drawers were on a chair. She was dead, sitting against the wall. The chair was close to her."

After the whole of the evidence had been heard, with the speeches of counsel and the summing-up of the learned judge, the jury returned a verdict of *guilty*. On being asked whether he had anything to say why sentence of death should not be pronounced against him, he made the following address to the Court:

"I can say that I am entirely innocent. I never lifted my hand or finger to her till I found her cutting my throat. I shoved my hand up and got my thumb underneath the knife and got it cut. I tried to hollow, but could not. I took my handkerchief off and went out of the room, and I saw her drawers and put them to the wound. I went into my mother and father's room, and gave the alarm. When I came into the room again she was sitting against the wall, with blood coming out of her windpipe as thick as my finger. I was in my stocking-feet, which is the reason of their being saturated. I put my shoes on, which lay under the table, and went down stairs into the street, when Dillon was looking out of the window. The deceased was not laid out on the hearthrug. I will be on my oath before God and man, she was lying with her back against the wall, and as the blood came from her so came her body down, and then I left her; her head was at the side of the chair. I went out of the room, and she was sitting on her bottom, her legs not stretched out at all. There was no pillow, only my jacket, which had been on the hearthrug, with a lot of blood on

it. When she got out of bed and asked me to forgive her her shift was not torn. She had pawned and sold everything she could make a penny of. I never accused her of anything, and never struck her until Saturday. When she asked me to forgive her I told her I could not, and she said, 'I will tell you all I have done.' I can be on my solemn oath I never had the knife in my hand from when I had my supper over-night till my mother saw me pick the knife up. I said, 'Oh, mother, here is the knife she has done it with,' and put it on the table. I can be on my solemn oath, if I die to-morrow, I am not guilty of the death of Agnes Oaks."

These statements, it will be perceived, are not consistent with each other nor with the facts proved in the case.

That the death of the woman was not an act of suicide, but the result of a murderous attack, there can, I think, be no reasonable doubt on considering all the medical and other circumstances. If the prisoner was convicted of this act of murder, this did not arise from the medical evidence so much as from the moral and circumstantial evidence taken, together with the conflicting statements which he himself had made. It was entirely a question for the jury to say who inflicted the wound on Agnes Oaks. The medical witnesses admitted that she might have produced it on herself, and, if not, it was an open question for the jury to determine who, on that night, had the motive, means, and opportunity of committing this act. There was no evidence against the father and mother, and the only other person on the premises was the prisoner. The circumstances which probably led to his conviction were, in reference to the deceased—

1. The nature of the wound or wounds in her neck and the parts involved. The description of it given by Mr. Horton shows it to be most unusual as an act of suicide, and just such a wound as might be produced in a murderous assault by another.

2. The remarkable position of her dead body—with the head lying backwards on a pillow and the prisoner's folded jacket—the head covered by a chair, in the seat of which was a quantity of blood covered by an apron—the body outstretched.

3. The hands had blood upon them, back and front, as if smeared over them. There was no blood upon her arms.

Smearing is not the condition in which blood would be found on the hand of a person who had inflicted such a wound as this on her throat. Deceased was right-handed, but both of her hands were equally *smear*ed. Although her hands were thus found bloody, there was no blood on the *handle* of the knife, the only instrument in the room with which the wound could have been produced. The knife was not found near the body, but was on a table in the room.

These facts show that the blood on the hands had probably been placed on them after death. If assumed to have been there before death, then there would have been blood on the handle of the knife, supposing it to have been at any time in the hand of deceased.

4. The shift of the deceased was torn completely down to within a short distance of the bottom, and was stiffened with a large quantity of dried blood from top to bottom. It is not pretended that deceased went to bed with a shift thus torn. It indicates a violent struggle before death and while she was still bleeding. The prisoner's sister-in-law deposed that deceased was a tall powerful young woman. She was, therefore, likely to make a strenuous resistance. That the whole front of the shift to the bottom was bloody proves that she was in the erect or sitting posture when the fatal wound was produced. Had she been recumbent, blood would have been found chiefly on either side of the neck.

The circumstances in reference to the prisoner were—

5. The nature of the *wound in his own throat*, which was slight and superficial, merely involving the skin with the external jugular at its commencement on the left. As it passed to the middle of the throat on the right it was not through the skin. This is not such a wound as a powerful young woman, bent on murder, would inflict on a man unawares while he was lying down. Prisoner was, according to his own statement, held down by her *left* hand and struggled to get away. This wound gives no indication of a struggle, but rather of the deliberate drawing of a knife cautiously and steadily across the throat, in which great care had been taken not to carry the knife in too deeply.

This is just such a wound in the throat as a man desirous of averting suspicion from himself would produce, the situation

and direction being from left to right, the wound merely skin deep and ending almost imperceptibly. The infliction of such a wound by another in a murderous assault would require great care and caution in the use of the knife, and a desire to do as little injury as possible. Any struggling would be likely to alter the appearance of the wound towards its termination.

The appearance of the blood on the left side of the prisoner's shirt and at the back was such as might have been produced by trickling or flowing down from a wound of this description, while the person was erect or in a sitting posture. It is also consistent with a man getting up after being so wounded. From the state of the front of the shirt and the collar, it is probable that the shirt-front was open so as to expose the neck, and that this was not then covered with a thick neck-handkerchief, as alleged by the prisoner.

6. *The cut in the handkerchief.*—This has been elsewhere fully described. According to the prisoner this had been done by the woman in the attempt to cut his throat from behind while he was lying on his right side. As the numerous cut folds in the handkerchief were not bloody, it could not have been done with a knife fresh from a wound which had cut through the external jugular vein. The handkerchief must, therefore, have been cut before the wound in the throat was made. But as the wound in the neck was on the left side and the cut in the handkerchief, as worn, was on the right side, or in the opposite side to the wound as described by Mr. Dove, it follows that the prisoner's head must have been raised and partly turned round by the alleged assassin before the cut into the handkerchief could have been made. This must have fully aroused the prisoner and interfered with the subsequent production of the even wound on the left side of his neck.

But, as it has been elsewhere stated, the cut through the handkerchief was at right angles to the folds and to the neck; it would have required great force for its production, and the handkerchief must have been pulled some distance from the neck before it was cut, or the neck could not have escaped being wounded on the right as well as on the left side. The prisoner's statement is wholly irreconcilable with the facts. We are asked to believe that the woman in a deliberate attempt at murder first made a cut across the thick folds of a cotton

handkerchief, which would require considerable force and a peculiar disposition of the handkerchief for the purpose, and that she afterwards produced, in the man's throat, a superficial skin wound requiring no force for its production!

The only consistent explanation of the facts is that the handkerchief was not then on his neck, and that it was deliberately and designedly cut when off the neck. If the woman did not produce these cuts in the handkerchief and throat, they must have been produced by the prisoner himself, and for what purpose if not to avert suspicion that he had killed the deceased woman? This damnatory evidence can, it appears to me, receive no other explanation. Whether the prisoner was alone concerned in this act of murder, it is not necessary to inquire. No man would be guilty of manufacturing evidence of this kind merely to avert suspicion from another person.

7. *The marks of blood.*—The blood from the wound in his neck appeared to have flowed chiefly down his shirt inside, and to have been absorbed by the red handkerchief subsequently applied. But it appears to me, from the evidence, that the wound in his neck is inadequate to explain the considerable quantity of blood found on the floor, the walls, the hearthrug, the seat of the chair, and in the woollen soles of his stockings. If his statements were correct, the woman's wound must have been produced *after* that in his own neck; he put on his boots and ran out of the room to give an alarm. If the large quantity of coagulated blood on his stocking-soles came from his own wound, it is obvious that it must have been blood just escaped from the divided external jugular. His own statement is that he put on his boots and went out to give an alarm. If this were so, how did it happen that the inside of the leather corresponding to the heels was not deeply stained with blood? The thick woollen stockings, so saturated as they were, would, if then wet with blood, have impregnated strongly the leather, and have adhered to it. Whereas there was no mark of blood, and only a mere trace of a bloody substance could be found by scraping and examining the leather from the insides of both heels.

These facts show that the stockings must have been dry or nearly dry when the boots were put on, and that they may have

been stained with the blood from the wound of Agnes Oaks, inflicted three or four hours before. This would have allowed sufficient time for the blood to become dry.

8. The fact that the blood on the floor and wall of the room, and on the *shift* and hands of the deceased, was dry when seen by Mr. Horton, is not consistent with the view that it had escaped from a wound which had been inflicted only half an hour before. On the other hand, it is consistent with the theory that this dried blood had issued from the wound in Agnes Oaks' neck three or four hours before the body was seen by Mr. Horton.

9. The coldness observed in the body by various witnesses,—by one within five or ten minutes after Agnes Oaks had cut her throat (according to prisoner's statement) and by an experienced surgeon, who also noticed that the arms and legs were not only cold, but rigid, within half an hour, are facts not consistent with the theory that her wound was produced after his, *i.e.* about five o'clock, but they are consistent with the view taken by the prosecution, that she had been dead three or four hours.

There was nothing in this case to accelerate the cooling of the body or the access of rigidity or *rigor mortis*. Although persons may differ about the sense of heat and cold in feeling a dead body, yet all, when separately examined, agreed about the fact without knowing the effect of such evidence in a medical point of view. Their observations were confirmed at a later period by the special examination of an experienced surgeon, Mr. Horton. He finds the limbs not only cold, but stiff—the legs, which are the last portion to undergo this condition, being rigid.

This state of the body is not consistent with a death so recent as the prisoner's statement would imply. It is consistent with the death of Agnes Oaks three or four hours before, and also with the cries of murder heard proceeding from the direction of prisoner's house shortly before two o'clock in the morning. It is also consistent with the dry state of the blood on the dress of the deceased, and in the room generally.

It is probable, from all these facts, that the prisoner returned home at the time he states—about one in the morning; that deceased, who had gone to bed, let him in, in her night-clothes or shift, and that their quarrelling was renewed. About three quarters of an hour after he had entered the house, *i.e.* about a quarter to

two, when cries of murder were first heard by the neighbours, he cut her throat with the table-knife. From the condition of her clothes, she was most probably in the erect position and struggling with him at this time. The tearing of the shift and the diffusion of a large quantity of blood over the floor, the walls, the hearthrug, and into the seat of the chair, may thus receive an explanation. There is no proof that she went to bed again after he entered the house. At any rate, the murderous assault did not take place there, for there was no trace of blood on the bed or bed-clothes. About daybreak (five o'clock), when the matter could not be longer concealed, it may be presumed that the prisoner, in order to give a plausible character to his story, made the cut in his handkerchief, and, laying bare his neck, produced the slight wound on his own throat. He then put on his handkerchief and boots, and with his father and mother went into the street and raised an alarm. How or when or for what purpose the dead body of the woman was placed in the extraordinary position in which it was found, it is impossible to say. Why it should thus have been laid out with a chair over the face and a pillow supporting the back of the neck, it is impossible to form a conjecture. No voluntary act during life or spasmodic movement in the act of dying will suffice to explain these facts. It is equally difficult to say how or when the hands of the deceased were smeared with blood, and, if any blood had been at any time on the wooden handle of the knife, how, when, or why it was removed while the blade itself was left bloody.

The jury recommended the prisoner to mercy on the ground that the act was not premeditated. It may be suggested that the deceased was killed by the prisoner during a quarrel and in hot blood. Had this been admitted and an alarm given at once, the case would probably have been treated as one of manslaughter; but the prisoner's brutal ill-treatment of the woman a few days before, his open threat to get rid of her, and the crafty plans to which he resorted in order to make it appear that she had first attempted to murder him and then had committed self-murder, gave another aspect to the case, and precluded the admissibility of any other verdict than that of murder.

Before the prisoner's execution the most anxious consideration was given by the authorities in whose hands his fate rested to all the circumstances of the case. I am informed that the

medical evidence was privately submitted to the judgment of an experienced medical man who had not been previously consulted, and that he confirmed and corroborated the conclusions which had been drawn by the witnesses for the Crown. The general evidence also underwent a close sifting, but with a like result. All pointed to the guilt of the prisoner, and tended to show that he had endeavoured by artifice to fix the charges of attempted murder and suicide on a woman whom he himself had murdered. The prisoner protested his innocence to the last, but so have many other great criminals of whose guilt there could be no reasonable doubt.

FURTHER REMARKS
ON THE
STRUCTURE OF THE GROWTHS WITHIN
OVARIAN CYSTS.

-BY J. BRAXTON HICKS, M.D. F.R.S.

IN the volume of these Reports for the year 1864 I described the minute structure of the so-called proliferous disease of the ovary, and indicated its close resemblance to that of gland-tissue, and particularly of adenocoele of the breast.

The Plate which is appended to the present communication shows the minute anatomy of two growths, resembling in a measure those to which I have already alluded. They do not, however, belong to the proliferous form: inasmuch as by their expansion within a limited space, that is, within a cyst, the parts of which they were compounded crowded each other, so that a more or less solid formation ensued.

If we admit the possibility that many of the new structures found within ovarian cysts are, like the "dermoid cysts," of an ovular origin (not here stopping to inquire the exact nature of the stimulus given to the ovum whilst still within the follicle), we shall perhaps be better able to understand the character of the various aberrant structures which may be formed within the diseased follicles.

I have already, in my previous paper, thrown out the suggestion that these gland-like formations spring from the ovum; and I am also of opinion that this suggestion affords the best explanation of the origin of the two specimens here represented.

As is well known, there are great variations in the proportion of endocystic ovarian growth to the cyst containing it, these variations depending upon the amount of fluid or mucoid material within the cyst. Some cysts of the smaller sort frequently contain nothing but solid growth. Hence we must conclude, either that the solid portion from the commencement filled and distended the cyst, as it grew; or that the cyst at first contained fluid, which was afterwards gradually absorbed. This is probably how the "Adenoma" of Mr. Spencer Wells is formed. In such solid masses, after they have attained a certain size, false cysts are formed by fatty degeneration, breaking down, and absorption, &c., of their substance, so that after a time true cysts are left, with almost entirely fluid contents.

DESCRIPTION OF THE PLATE.

Fig. 1 represents a portion of a soft solid mass filling up the interior of a cyst of three inches diameter, found on the wall of a large nearly simple ovarian cyst (removed by ovariectomy by Mr. Durham, October 3rd, 1865).

The solid mass, although filling the cyst, was attached to it only on one side. It was very soft, and brain-like in general appearance. It was full of oval tortuous spaces, some produced by the flattening of the interior of its lobules: others corresponding to the sulci which ran deeply toward the centre between these lobules, which themselves were compressed against one another. The part represented in the figure was on the exterior of the mass; the interior differed from it merely in being in a more advanced stage of growth.

Fig. 2 shows the exterior of a mass which filled a secondary cyst in an ovarian tumour that was removed by Mr. Forster in January, 1865. The principal cyst contained fat, hairs, and other dermic structures. The mass in the secondary cyst was very soft, disposed like the convolutions of the brain, very lobulated, solid in the interior, but on its surface composed of smaller lobules, as shown in figure 2. These lobules were hollow, formed of only one layer of cells, but with processes formed of groups of smaller cells, pointing towards their centres. The nuclei were strongly marked, and the component cells very clear and transparent. It was evident that the more solid portion had become so by the mutual compression of the lobules as they grew.

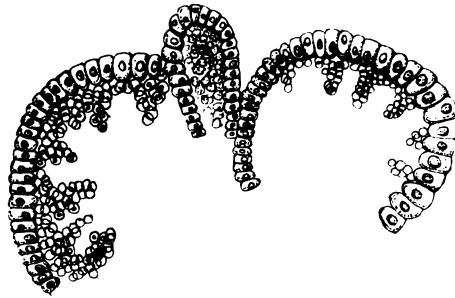
There were no bi- or poly-nucleated cells in any part of either growth.

How far these two specimens are really "gland-like" may be an open question; many more observations are yet required. I put them on record as a slight additional contribution to this interesting branch of pathology.

Fig. 1.



Fig. 2



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ON ACCUMULATION
OF
MUCUS WITHIN THE TYMPANUM,
AND ITS
TREATMENT BY INCISION OF THE MEMBRANA TYMPANI.

By JAMES HINTON.

AN excessive secretion from the mucous lining of the tympanum and its retention within the cavity of the ear appear to be, in fact, not less frequent than a consideration of the structure and relations of the part would lead us to expect. Such accumulations present several varieties. The simplest form is the slight and transient hyper-secretion which is so frequent an accompaniment of an ordinary cold, and which may have as its only indication a somewhat moist or gurgling sound on the inflation of the ear, lasting for a few days and entirely disappearing. Less frequent, but still not seldom to be met with, is a further stage of the same condition, in which after more or less pain and sensation of fulness in the ear the hearing becomes impaired, and on examination the membrana tympani may be seen of a dull, semi-translucent, greyish hue, sometimes slightly bulging, and traversed by red dilated vessels, the largest of which descend from the roof of the meatus and enclose the malleus; while inflation of the tympanum, either by the patient or on Politzer's method,¹ gives a distinct sound of fluid. Inter-

¹ Forcing a stream of air into the nostril while the patient swallows.

mediate between these two forms, a class of cases is met with in which, though the hearing is impaired or an annoying tinnitus persists, the membrana tympani retains its healthy appearance, and the presence of secretion in the tympanum is made manifest only on inflation, by the sound produced, or by the fluid being brought visibly into contact with the inner surface of the membrane.

In these cases, when recent, if the patient is or can be made fairly healthy, a simple treatment generally suffices for the removal of the local affection; as, for example, a short course of counter-irritation, combined with the use of alum spray to the fauces, or daily syringing through the nostril a small quantity of a solution of carbonate of soda. The mucus palpably diminishes in quantity; the vascularity of the membrana tympani, if it have been present, gradually disappears, and the membrane resumes its normal translucency, but may remain for a longer time as if relaxed, bulging to excess before the inblown air, which finally enters with the natural soft blowing sound, and the hearing is entirely restored. I have, however, met with cases in which symptoms evidently indicative of mucous accumulation within the tympanum recurred several times under circumstances productive of nervous exhaustion, and yielded to rest and change.

When the inflammatory action reaches a higher grade, the membrane may, in the course of a very few days, become swollen into a red and fleshy mass of irregularly convex form, in which no trace of its natural structure or of the malleus can be discovered. The presence of fluid is easily detected by the ear, and in one or two weeks the inflamed membrane ulcerates and gives exit to thick masses of viscid mucus, more or less mingled with pus.

In these cases, also, attention to the health and to the condition of the throat often suffices for the treatment; especial care being taken to keep the Eustachian tube pervious, and to ensure the free passage of air, at least once daily, from the throat completely through the opening in the membrane. As a lotion, soda or potash may be used at first, and afterwards the sulphate of zinc; the tincture of opium being with advantage added to each.

But there is another class of cases, very frequently met with,

in which the secreted mucus is neither absorbed nor escapes through the Eustachian tube, nor finds its way through the membrana tympani, but remains for an indefinite period within the tympanic cavity, producing varying degrees of deafness and local or general distress. These cases have long been recognised to a certain extent, and the late Mr. Toynbee introduced for their treatment a small syringe with which, in a few instances, he pierced the membrane, and withdrew a portion of the fluid; but it is not until quite recently that their great frequency has been understood, and the facility with which they may be cured by incision of the membrane has been appreciated¹—a result to which the rapidity and certainty with which incisions of the membrane made for other objects have been found to heal, have largely contributed.

Cases of this kind present themselves in various forms, but those most frequently met with are—

1. A severe catarrhal affection of the tympanum, connected with a similar condition of the faucial mucous membrane, but continuing unrelieved in spite of a successful treatment of the latter.

2. A condition which is probably, at least sometimes, a subsequent stage of the same affection. In these cases the symptoms of local irritation have subsided, or may never have attracted attention, and there remains nothing but a variable degree of deafness with or without tinnitus. On examination, the membrana tympani is usually concave and of a dull, white appearance, but at certain parts presents either—

(a.) A yellowish or brownish hue, which the eye soon learns to recognise as due to the presence of a dark-coloured fluid in contact with its inner surface.²

(b.) A *bulging*, of a silvery white or reddish colour, more often seated at the upper posterior part of the membrane than elsewhere.

(c.) Thinner and more transparent spots; often very much drawn in, but which, on inflating the tympanum with air, bulge prominently outwards, and are evidently filled with fluid; the

¹ See especially Schwartze, 'Die Paracentese des Trommelfells,' Halle, 1868.

² It is necessary to distinguish the appearance of fluid from that of the promontory seen through the membrane, with which it might at first sometimes be confounded.

bladder thus produced sometimes occupying more than half the membrane.

In all this class of cases the only method of giving permanent relief appears to be the evacuation of the fluid by incision of the membrane repeated as often as the necessity arises. As the rule, owing to the rapid closure of the wound, more than one incision is required. Inflation of the tympanum with air often produces a temporary improvement, and the symptoms may so far mend under general treatment as to lead to the belief that a permanent cure is effected, but they are constantly prone to recur. The thorough evacuation of the fluid, on the other hand, results in the restoration of a perfectly healthy state. Relapses, indeed, take place on the recurrence of an exciting cause, but these are not the rule, and I have found subsequent attacks yield still more readily than the first.

The following cases illustrate the effects of the treatment :

CASE 1.—Catarrh of each tympanum ; mucus remaining in the cavity ; incision first of the right and afterwards of the left membrane ; complete recovery.

Harriet C—, æt. 48, unmarried and somewhat delicate, living in a damp situation, applied to me on May 16th, 1868. Her hearing had been quite good until December last, when, during a severe cold, she became gradually deaf, with some pain, but not severe, in the throat and ears. She had been carefully treated with applications of nitrate of silver and other means, and had tried change of air. The throat had become much better, but the deafness, though better at times, continued on the whole unchanged. She required a raised voice ; watch heard only on the left side, at one inch. The tuning-fork was well heard on the head, loudest on the left side. The membrana tympani on each side was bright and thin, extremely concave, the malleus running almost horizontally backwards ; on the right side it had a translucent pink hue, but the outline of the tympanic wall was distinctly visible. The Eustachian tubes were impervious, but on using Politzer's inflation, air entered each tympanum with a faint moist sound, causing a slight bulging of the membranes, and the appearance of a yellow fluid

within. The hearing was improved : watch, right, one inch ; left, five inches.

A solution of soda to be syringed through the nostrils ; a liniment of iodine, ammonia, and chloroform ; potassæ chlorat. gr. x, acid. hydrochl. ℥x, ter die.

May 18th.—The improvement continues in part ; the membranes are less drawn in, but the fluid behind them is still more plainly visible. On inflating the ears the hearing rose on the left side to twenty-four inches ; on the right to two inches only. The case appeared to me a very suitable one for testing the treatment by incision, especially as each ear presented a similar condition, but to a greater extent on the right side ; and as the patient came from the country it was desirable not to delay. Accordingly an incision, one line and a half in length, was made in the right membrane at the inferior and posterior part, and on the patient forcing air through the drum a limpid, brownish fluid escaped, to the amount of fully ʒss, and ran out of the meatus. At the same time the dark colour disappeared from the membrane, and the hearing rose to ten inches. Powdered alum was applied to the faucial openings of the Eustachian tubes. Cont.

19th.—Thick white mucus was blown out from the right tympanum (by Politzer's inflation) through the incision. The appearance of fluid behind the left membrane was more marked.

20th.—The incision had closed ; air blown in entered with a sharp dry sound, but there appeared at the upper and anterior part a bladdery swelling of red colour, about two lines in diameter. This swelling was incised, a little thin reddish fluid escaped, and it entirely disappeared. Watch, each side, thirty-six inches.

On the 22nd the patient returned home, hearing moderately well on each side, though by no means cured of the disease. The inflation of the tympanum was not repeated, owing to the effect it had produced on the right ear. She was directed to continue the treatment and to return in three weeks.

On June 13th, accordingly, I saw her again. As was to be expected the hearing had fallen back, but the right side (the one operated on) was now the better, and was considerably better than at the first visit. This was not the case with the left. Watch, right, one inch ; left, contact.

The right membrane was of a dull patchy white colour, a good deal drawn in anteriorly; the left was as much drawn in as at first and presented the dull dark colour of fluid within. Eustachian tubes impervious. On inflating the ears, the hearing rose on the right side to thirty inches, on the left to five inches only, and a distinct bulging presented itself at the posterior part of the left membrane.

The advantage of the previous incision being thus in my judgment sufficiently proved, a similar one was made in the left membrane, and a brown limpid fluid escaped. After repeatedly passing air through the tympanum, the hearing rose to twenty inches.

From this time the *right* ear continued quite well, the Eustachian tube remained pervious, and the hearing good; fully forty inches for the watch. On the left side a boil formed in the outer part of the meatus, causing a good deal of pain. The incision closed on the fourth day, although air was passed daily through it, but another bulging of the membrane formed on the tenth day and was incised, giving exit to a large quantity of viscid mucus. A solution of carbonate of potash was syringed from the meatus through the Eustachian tube into the throat. On the twelfth and fourteenth days more mucus was evacuated by means of Politzer's inflation, the secretion being so viscid as to clog the orifice in the membrane. At the end of three weeks there was no longer any appearance of fluid; the membrane had regained its natural curve, though not its perfect transparency; the Eustachian tube was pervious, and the hearing, although not quite equal to that of the right ear, was entirely satisfactory to the patient; for the watch thirty-six inches.

In this case the advantage of the treatment by incision of the membrana tympani seems proved by the comparative progress of the disease on the two sides. In fact, at the time when the ear first treated by incision was fairly well, the other remained practically in its original condition, and this, although the case was comparatively recent, and the coincident affection of the throat, or at least of the pharynx, had been subdued. The patient suffered under a long-standing relaxation of the mucous membrane of the larynx.

It will be observed that the hearing was temporarily much improved, in the ear in which the incision was deferred, by the

mere inflation of the tympanum with air, but that this effect was only temporary and could not be reproduced at a subsequent period, and, also, that though the ear last incised (the left) was on the first visit the less affected, yet—possibly from the longer continuance of the viscid mucus within the tympanum—its treatment was the more tedious of the two, repeated incision being needed. After the evacuation of the mucus the deafness on the right side partly returned (as was indeed to be expected), but it was due merely to a closed condition of the Eustachian tube, and was removed at once, and permanently, by the introduction of air into the tympanic cavity.

In the following case the morbid condition dated from childhood, and had been long treated unavailingly.

CASE 2.—Disease of each ear since scarlatina thirty years previously ; mucus in left tympanum ; evacuation and immediate restoration of hearing ; deposit in right membrana tympani, hearing becoming good.

July 2nd, 1868.—Rev. L. E—, æt. 38, healthy, never heard well since scarlatina at the age of 8 ; was worse after an attack of rheumatism some years ago ; has had tinnitus, which is lately much better. The right ear was formerly the worse but has improved ; it has been sometimes better for the cotton wool ; the left ear has remained as it was, and is now the worse ; has had much treatment, including repeated inflation of the tympanum. He required a distinct voice ; watch right, sixteen inches ; left, half an inch. Tuning fork on head well heard ; loudest on the left side.

The left membrana tympani was of a dull whitish hue, very much drawn in. He could not inflate the tympanum ; air entered it on Politzer's method, but with no effect on the hearing. With the catheter the air passed in with a harsh moist sound, raising the hearing for the watch to five inches. A solution of soda with sugar to be drawn through the nostrils. Ammonia and iodine for friction.

8th.—Was better in hearing for two or three days only. Is now as at first. The throat is somewhat red and swollen. Inflation on Politzer's plan caused some improvement on each side. To

apply alum in powder to the posterior part of the fauces by means of a tube every morning.

23rd.—The hearing had sunk again on the left side ; watch heard only on contact. The membrane much drawn in, white and shining, but with a slight yellowness at the central and posterior part ; this appearance was increased by inflation, which again raised the hearing to five inches. An incision was made in the membrane ; no fluid escaped, but on again forcing air through the Eustachian tube a large quantity of viscid yellow mucus was blown out. Watch heard at ten inches.

Eight days afterwards the left ear continued "as well as he wished it to be." Watch twenty inches. The membrane was of a whitish flat appearance, showing only a slight mark of the incision. He did not inflate the tympanum ; air passed in entered with a faint dry sound, not affecting the hearing. Since this time I have not seen him.

In this case the condition of the right ear, though different, was also interesting. On the first visit the watch was heard at sixteen inches ; masses of epidermis adhered to the posterior wall of the meatus, which was sore and swollen. The whole of the anterior part of the membrane was occupied by a thick and dense deposit of white colour ; posteriorly the membrane was thin and wrinkled, blowing out into a bladder on inflation.

Cotton wool applied in the position of the stapes caused a slight improvement. In all probability the thinned portion of the membrane represented the scar of a former perforation. The cotton wool was not worn, as the hearing was not very bad upon that side ; and in three weeks' time, treatment having been directed solely to the throat, it had risen to fifty inches for the watch ; very nearly the average distance. The case is one of a class, not very rare, which exhibits the co-existence of a very fair amount of hearing with a great amount of disease of the membrane, and in all probability of the tympanum as well.

These two cases may suffice as instances of the two chief conditions under which an incision of the membrana tympani is demanded for the evacuation of mucus. The relief which follows is in almost every case very striking ; and though, owing to the rapidity with which healing takes place, the incision may need to be repeated three, four, or more times, I have not yet met with an instance in which the tendency to re-accumulate

did not cease in the course of about fourteen days. In two instances, however, after an apparently perfect result, I have seen the accumulation recur at intervals of three and nine months respectively; but in the former, the primary treatment was cut short, owing to the departure of the patient from London. One of these cases I may relate; it had been more or less under my observation for several years, and perhaps exhibits the course of that form of chronic affection of the tympanum, which tends to issue in a large accumulation of mucus.

CASE 3.—Repeated attacks of tympanic catarrh on each side; at length bulging of the right membrane; incision and escape of much thick matter; return after nine months; re-incision.

H. C—, healthy and strong, but with a decided hæmorrhagic diathesis, frequently suffering from epistaxis which ceased only on his becoming faint. No deafness in the family; his own attacks most frequently following bleedings of the nose. At the age of four or five he had a slight discharge from one meatus, and had been occasionally hard of hearing at that time and since. At nine he had an attack of deafness attended with pain in the head, especially at the back part, and great tinnitus, with feverishness. Throat relaxed, and tonsils somewhat enlarged. Each membrana tympani appeared dull and rather flattened. Iodine was painted around the ears for a few days. In two months the hearing was nearly perfect; but again fell back after an attack of epistaxis; the ears feeling stuffed and stopped up, and the tinnitus violent; membranes of a pearly opacity. From this attack he soon recovered, and the hearing continued pretty good for about a year, the left, however, being the better; he had occasional tinnitus. During the attacks of catarrh he could not inflate the ears, and on account of the tendency to epistaxis air was not passed in artificially until a later period, and then but seldom and very gently.

June 3rd, 1864 (at age of ten) an attack of fulness and tinnitus in *left* ear. Watch three inches (right, forty inches). Right membrana tympani appeared normal: on the left side the malleus was slightly prominent; delicate red vessels running beside and in front of it, and radiating to the circumference:

at the superior part of the membrane a marking of delicate oval lines, exactly representing bubbles, which doubtless they were, of mixed air and fluid within the tympanum.¹

In a week the left ear had improved, but the right had become affected. Watch, right, three inches; left, thirty inches. Right membrana tympani of a dull porcelain-like whiteness, with red vessels radiating over its surface; malleus white and clear; behind it at the upper part a small patch of bright redness, and another rather larger in front of it, the surface of the membrane looking red and swollen, but no distinct vessels being traceable there. This appearance ceased after a few days, as also did the appearance of *bubbles* on the left side. By the end of the month the hearing had much improved, and he left town.

In November of the same year (1864), after a nose-bleeding and exposure to draught, he had a slight attack of bronchitis, and the left ear became again affected, but soon recovered. In February, 1865, on the third day of a severe cold in the head, pain and deafness occurred in the right ear, soon followed by a watery discharge. The meatus was somewhat swollen and contained much soft sodden epidermis, hiding the membrane, which was afterwards seen slightly vascular and dull. In a few days there was a little discharge also from the left ear, in each case coming evidently only from the meatus. On March 1st and 2nd, a nose-bleeding, after which he gradually improved. In July he had scarlatina very slightly, the ears not being affected by it.

September 9th, 1866 (æt. 12).—The hearing has been good until about a fortnight ago, when he became very deaf. He had had a severe bleeding a few days before. Hearing now much better; watch, each ear, about thirty inches. The appearance of the right membrana tympani seemed to indicate a thickened mucous layer; anteriorly at the upper part was a white circular spot suggestive of a white substance within the tympanum; and the whole membrane presented a mottled patchy whiteness evidently seated internally and seen through the external more transparent layers. This was most marked posteriorly and above, where it formed a broadish crescent. Concavity not

¹ This appearance has been also observed by Dr. Lucæ and Dr. Politzer, and described by the latter as collection of *serous* fluid in the tympanum.

excessive. Left membrana tympani appeared healthy; being compared with that of a well-hearing brother. Liniment of ammonia and iodine. Alum by spray-producer to the throat and nose.

January 2nd, 1867.—He recovered soon from the last attack, and remained hearing fairly. Two days ago, however, he had a severe nose-bleeding, and last night was kept awake by pain in left ear. Watch, right, thirty inches; left, five inches. Right membrana tympani appears less white than on last report; left meatus swollen a little, and near the membrane its posterior wall is red. The posterior portion of left membrana tympani is of a dark frosted aspect, the malleus appears only as a broad red streak. A chlorate of potash lotion was used and counter-irritation; and this attack also subsided.

On November 4th, however, he had epistaxis, and again in a week; and immediately after the second bleeding he had a slight earache in each ear, and became deaf. I saw him on the 18th; throat a little tumid; left tonsil somewhat large. Watch, right, two inches; left, four inches. The right membrana tympani presented a distinct bulging of circular form, occupying all the posterior superior part, and of a silvery white surface (like very fine "ice-glass"): the lower portion of the membrane was flat and of a pale violet hue; malleus visible only as a red streak; posterior wall of meatus also red.

An incision was made, about a line in length, in the most bulging part, and a little fluid escaped; but on passing air on Politzer's plan a large quantity of dark-coloured viscid mucus began to run out of the meatus. The inflation was repeated three times and fully 3j of mucus was removed. The hearing rose to fifteen inches. A small blister. Alum in powder to the throat. Tinct. ferri perchlorid. ℥x, ter die.

The next day the orifice was closed, at least air could not be passed through it; and the hearing had again diminished. The malleus and the meatus were less red. In the position of the former bulging was a shallow oval depression, bounded above by a broad white curved ridge. On inflation this was blown out into a bladdery appearance. On the fourth day no scar was visible; but the bulging had re-formed, projecting below into a small white nipple. He could inflate the ear. Watch four inches. On the fifth day, the bulging being very decided, I

again incised the membrane, and again there escaped—after his own inflation—a large amount of similar viscid mucus, scarcely less than before. Watch fifteen inches. Fluid continued to escape for some hours, but had ceased on the next day; he blew through the orifice a small bubble of mucus. Membrana tympani flat and white; watch twelve inches. The second incision healed in two days, its position being marked by a thin depressed oval spot, to which a small red vessel ran from the posterior border: superior part of the membrane white and thick; lower portion healthy. Vascularity of malleus almost disappeared. At first the membrane bulged on inflation into a bladdery projection, but this ceased in a few days, and the hearing, which had again sunk to two inches, gradually rose. A severe nose-bleeding which now occurred did not interfere with the progress of the case, and in the course of a month the hearing had become quite good; watch six feet.

August 10th.—Nine months after, during a severe cold, deafness returned in the right ear, and on examination the membrane was seen again to be bulging in the same position as before. This was incised again with a similar result, closing in thirty-six hours. The patient went on the third day to Scotland, where a discharge continued for fourteen days. On October 25th the hearing was found perfect. Watch between five and six feet; membrana tympani healthy, with the exception of a whiteness at the upper part.

During this attack the left ear showed no very distinct signs of fluid; the membrana tympani was white posteriorly and appeared slightly prominent, but was thin and indrawn anteriorly. Redness along malleus. After a few days he was able to inflate the tympanum and the hearing gradually returned.

It is interesting to note, as bearing upon the question of the tendency of inflammatory affections of the tympanum to implicate the labyrinth, that during one at least of these catarrhal attacks the hearing of the tuning-fork placed upon the head was to a certain extent diminished, returning again as the other symptoms disappeared. During the last attack, also, closure of each meatus *diminished* instead of increasing the sound of the tuning-fork upon the head. A certain interpretation of this fact, I believe, cannot as yet be given. I have known it to occur when the meatus has been occluded with cerumen: I believe from

other observations it may occur also in consequence of the presence of mucus in the tympanum ; probably for a similar reason in each case—pressure transmitted through the foreign substance to the expansion of the nerve ; but it occurs in other conditions also. In this case the closure of each meatus alike diminished the sound : whether this should be held to indicate presence of fluid—not otherwise proved—in the left tympanum as well as in the right, I will not undertake to say. It is not unlikely that a greater familiarity with the signs of that condition would have led me on other grounds to recognise it.

How far the mucous accumulation in the right ear was merely a recent incident, or a gradual result of the repeated attacks of tympanic catarrh, the evidence does not suffice to show. My own impression would be that it had gradually collected during a considerable period, doubtless with intervals of diminution. The position in which the bulging presented itself is worthy of attention ; this was not in the lower but decidedly in the superior part of the membrane. I believe this is the rule ; and it agrees with observations that I have repeatedly made in dissections, that the thick and tenacious mucus which collects in catarrh of the tympanum does not generally gravitate to the bottom of the cavity, but rather collects in the upper part, clinging around the heads of the malleus and incus. It is obvious that this circumstance furnishes an additional reason for seeking to evacuate it as soon as possible, inasmuch as, it seems to me, its continued presence in that position must tend to give rise to causes of impaired mobility of these bones.

That mucus drying up and becoming dense in the cavity of the tympanum is a frequent cause of confirmed deafness, was an opinion long ago entertained : it was expressly stated, for example, by Itard ; and my own observation both of morbid phenomena and of remedial processes strongly tends to confirm it. I believe much may be done for the relief of some hitherto uncured cases, by seeking the removal of mucus long retained within the tympanum, and affording very slight and even as yet unrecognised indications of its presence. Unfortunately—and hence an additional reason for prompt action in the earlier stages of the affection—in some long standing cases of deafness in which I have removed by incision masses of dense mucus from the tympanum, the improvement resulting has been too

slight to be of much avail, owing to farther changes demonstrably implicating the nervous apparatus, but in all probability having their original source in the disorder of the tympanum; a disorder which the early evacuation of the retained mucus might possibly have brought to an end before its injurious influence had been so fatally extended. Of such cases, in which it appears to me that the hearing might have been saved by timely interference, I may briefly narrate the most striking I have met with.

CASE 4.—Extreme deafness, greatest on the left side; disease of the tympana, complicated with nerve affection; evacuation of semi-solid masses from the left tympanum by incision; partial improvement.

January 18th, 1868.—Miss S. A., æt. 24, healthy, but rather weak; about ten months previously subjected to severe mental shocks, which, however, have left no indications of general nervous derangement. Six years ago had rheumatic fever; for about two years subject to severe vertex headaches. About nine months ago the left ear became deaf, with severe tinnitus. She had a cold, and spoke thickly at the time; shortly before she had suffered from giddiness. This and the headache became better at a water-cure establishment where she went three months ago. Shortly after the right ear had also become deaf. The deafness varies much in the right ear; when she is most deaf she sleeps much: hears better in a noise. Catamenia regular; throat tumid, and often relaxed. She required a loud voice on the right side; on the left no word could be understood, nor could she hear a piano. The crack of the nails was heard on the right side at fifteen inches, on the left at two. One of König's large tuning-forks was not heard on the head, and very imperfectly on the teeth; best on the right side: closure of the meatus increased the sound slightly on the right side, not on the left.

Right membrana tympani of dullish, grey hue, except a small spot anteriorly, which appears thin and relaxed. Can inflate the right ear, the membrane yielding slightly, without effect on the hearing.

Left M. T. of an uniform dull, white appearance, slightly flat. Tympanum not inflated; air passed on Politzer's plan entered the right ear only.

Tonics were given; iodine and ammonia applied externally; Politzer's inflation used to the right ear, and the left Eustachian tube opened by the catheter and bougies; vapour of iodine, and afterwards a solution of hydrochlorate of ammonia (gr. x — ʒj) were introduced into the tympanum. In three weeks both ears were improved; on the right side a moderate voice was heard with ease, and the watch at four inches; with the left she could hear distinctly-spoken words, and the watch on contact. The hearing, however, was subject to very sudden and rapid variations, apparently of a nervous character. Air blown into the left ear entered with a slightly moist sound, and the membrane would sometimes bulge strongly, with a thick white aspect, around the malleus.

In about six weeks, soon after hearing of a very affecting death, she became a good deal worse again in hearing, and again came to me. Watch just heard on right side; left ear about as at first. She was seen with me by Dr. Hughlings Jackson, who discovered no indications of general nervous disease. R Pot. Bromid. gr. x; Liq. ferri perchlor. ʒ x ter die. Alum and sugar in powder to the throat daily. A solution of Ammon. hydrochl. gr. x — ʒj injected into left tympanum three times a week.

On the tenth day, after Politzer's inflation, a slight greyish appearance was seen in the left membrane, which suggested to me that mucus was present; and as the ear was practically useless I incised the membrane posteriorly. There was scarcely any pain or bleeding, and the membrane felt tough and resisting. No fluid escaped; after using Politzer's inflation there seemed to be mucus *at* the wound, but none came through it. Accordingly, a solution of iodide of potassium was syringed through the ear by means of the Eustachian catheter, with the effect of washing out a mass of firmly solidified secretion, of a dirty white colour, nearly as large as a pea. On the two following days, three more similar masses were in like manner washed out of the tympanum, the whole forming a mass as large as the kernel of a nut. In two more days the orifice had closed. The hearing at once improved, becoming about equal to that of the

better ear at her first visit. She was able, also, to hear with the left ear the upper notes of the piano correctly; the lower ones were also heard, but without any musical tone. The right ear had also improved again; watch, four inches. She left London, the medicine being continued; solution of soda syringed through the nose, and afterwards sulphuric acid spray employed. Since this time the hearing has varied, though it is on the whole better; the incision of the left membrane and washing out of the tympanum were repeated without any considerable farther effect. The right membrane also was incised, but no abnormal secretion was detected within the tympanum. Some improvement followed; but from the patient's letters I gather that the hearing of both ears still varies suddenly, partly with the condition of the throat, partly without very obvious cause.

In this somewhat indefinite case the mingling of tympanic and nerve symptoms will at once be recognised. The deafness is not greater at the catamenial period; there is no mark of hereditary specific disease. I would merely suggest whether the pent-up secretion within the left tympanum may not have had much to do with putting the nervous apparatus out of gear; and whether scientific surgery would not have demanded its removal at a much earlier period.

In conclusion of these fragmentary remarks, I would only remind the reader that they apply to *mucus* retained within the tympanum, and not to suppuration. In the latter case the advisability, indeed the frequent urgency, of a prompt evacuation of the matter by incision of the membrane has been often, if not yet often enough, insisted on.

ON
ACUPRESSURE AND TORSION.

By J. COOPER FORSTER.

I SCARCELY felt disposed this year to offer any remarks concerning acupressure, in consequence of the small number of opportunities which have been afforded me of applying that plan for arresting hæmorrhage, especially as in some of the cases which have occurred I have tried torsion, either simply or combined with acupressure. I feel also that the whole subject cannot be approached with any idea of coming to a conclusion until far more experience than even my opportunities have afforded me is recorded by unprejudiced observers. The following cases have occurred since the termination of my paper in the last number of the Reports. I have given a lengthened account of two cases, in which Mr. Howse has been good enough to examine the condition of the vessels after death, with his report thereon.

CASE 1.—M. B—, æt. 48, removal of right breast for carcinoma, torsion ; no adhesion ; all healed by granulation.

CASE 2.—Miss R—, æt. 52, removal of left breast for carcinoma, torsion ; no adhesion ; all healed by granulation.

CASE 3.—*Crushed femur ; amputation ; extreme atheroma ; secondary hæmorrhage ; pyæmia ; death.*

(Reported by Mr. HOWSE.)

Bethel Goodwyn, æt. 61, admitted on February 24th, 1868. Was a sailor, and had served both in the Crimea and in India ;

had suffered from stricture, urinary abscess and fistula; he was therefore an unfavorable subject for a severe injury.

Shortly before admission his left knee had been crushed between a barrel of lemon-juice and the ground. Three inches above the knee there was a wound two inches long, through which the femur could be felt crushed into several fragments. There was a second wound on the inside of the tibia close to the knee; the finger introduced here entered a large cavity between the capsule and the skin, through which the internal condyle could be felt also broken off. He was but slightly collapsed. Mr. Forster performed amputation by lateral flaps; the bone being cut through at the junction of upper and middle thirds. The arteries were found exceedingly atheromatous. Acupressure needles and wires were employed to restrain hæmorrhage.

February 26th.—Some of the sutures and all the needles were removed, but three wires were allowed to remain in the stump.

27th.—The rest of the sutures and wires removed to-day.

He went on tolerably favorably until the night of March 2nd, when secondary hæmorrhage occurred, which through neglect of the nurse was allowed to progress till it stopped spontaneously; he lost nearly two pints of blood.

On the 9th he had rigors; no stimulant had up to this time been ordered, it was now given freely. All the symptoms of pyæmia, however, set in, and he finally succumbed during the night of March 14th.

Post-mortem examination.—Stump very sloughy, many of the recent adhesions had broken down. In the bone there were indications (by a line of demarcation and difference of colour between the two parts) of the separation of a sequestrum. A fungous growth of granulations protruded from the medulla.

The superficial and deep femoral arteries were removed at Poupart's ligament, about one and a half inch above their union. They were hardened in spirit and a longitudinal section cut. The walls had become so exceedingly calcareous that the razor with which the section was made was reduced to a complete saw-edge.

Both arteries were wrinkled transversely from retraction, the profunda more especially so, the wrinkles having more the

appearance of incomplete septa going across the vessel than anything else. Between many of these septa clot was lodged, but this was much more the case in the profunda than in the superficial femoral.

The conservative effect which this clot might have in case of secondary hæmorrhage may be remarked upon here. Supposing that the clot at the lower end of the artery gave way at any time, the sudden rush of blood would be almost certain to dislodge some of the clot in the septal spaces, and this if large enough would plug up the gradually narrowing end of the vessel. This, however, is a natural mode of arresting secondary hæmorrhage not peculiar to those cases in which acupressure has been used.

Both vessels from above downwards narrowed gradually to about one inch from the lower end, when an abrupt constriction took place, the walls of the vessels being thicker at this point as if from contraction of the circular muscular fibre of the artery. For the last half inch the walls of both vessels were lying adpressed against each other; no adhesion had taken place between the internal tunics thus in contact, nor was the clot anywhere adherent to them.

The arrangement of the clot in the two arteries was different. In the superficial femoral for an inch above the constriction there was a but slightly decolorised clot, which was, however, firm and substantial, obstructing the whole calibre of the vessel, and resting with the apex of the cone upon the constriction. From this a long tail projected upwards for about three inches, filling less and less of the calibre of the artery. In the deep femoral there was far less clot, the lower end of the artery was only perfectly obstructed for about half an inch; some of this clot had moreover a looser texture and more recent appearance than that in the other artery. It is therefore probable that it was from this vessel that the secondary hæmorrhage took place, and it was in all likelihood arrested in the manner above noticed.

Branches.—The superficial femoral gave off no branches, save a small one about half an inch from the lower end; this was perfectly obstructed. The external and internal circumflex and three perforating branches of the deep femoral were given off as usual, the last perforating coming off about one inch and a half from

the lower end of the vessel; this fact may partially explain the smaller amount of permanent clot in this artery.

The femoral vein in the stump was crisp and full of clot for four inches up.

Both lung and liver were studded with numerous pyæmic abscesses.

CASE 4.—Man, æt. 31, great drunkard; compound comminuted fracture of forearm and hand; would not consent to operation until sixteen hours after the accident; hæmorrhage all the time; amputation of forearm; muscles swollen, vessels deep; acupressure answered admirably; any other plan of treatment would have been very difficult to adopt; four pins by the fourth method, removed in forty-eight hours; gangrene of stump; death from pleuro-pneumonia.

CASE 5.—Man, æt. 28, amputation of left forearm; severe compound comminuted fracture of hand and wrist-joint, two hours before admission; torsion of four vessels; in each instance a piece of the vessel twisted off; almost entire union by adhesion.

CASE 6.—Man, æt. 32, old standing disease of ankle-joint; amputation of right leg, five acupressure pins by the fourth method, two removed in twenty-four hours, three in forty-eight hours; secondary hæmorrhage in sixty hours, stump laid open; oozing had been going on since the patient had been moved in making his bed; one pin applied; all healed by granulation.

CASE 7.—Woman, æt. 41. Amputation of left breast for carcinoma; torsion of several vessels; secondary hæmorrhage; wound healed by granulation.

CASE 8.—Woman, æt. 60. Amputation of left breast for carcinoma; acupressure; two pins by the first method, three by the fourth; removal in twenty-four hours; chloride of zinc of the strength of thirty grains to one ounce applied to the wound; wound healed by granulation.

CASE 9.—A lad, æt. 16, disease of tarsus of right foot. A

very feeble ill-conditioned lad. Chopart's operation. Acupressure ; two pins by the first method, two by the Aberdeen twist, and six by the fourth method, all removed in forty-eight hours ; suffered a great deal of pain from the withdrawal of pins ; a good amount of primary adhesion ; did well.

CASE 10.—Woman, æt. 38, amputation of right breast ; six pins by the first method, two by the fourth ; all removed in forty-eight hours, not the slightest pain on removal ; a good deal of adhesion ; did well.

CASE 11.—*Compound dislocation of foot ; reduction ; profuse suppuration ; amputation ; secondary hæmorrhage ; death.*

(Reported by Mr. HOWSE.)

Thomas Goodall, æt. 50, admitted on July 13th, 1868. The then house surgeon (Mr. Colley) writes : " The right foot is dislocated at the junction of the astragalus with the scaphoid and os calcis. The anterior surface of the astragalus is exposed and turned inwards, the lower ends of the tibia and fibula being somewhat separated ; no fracture of the bones and no injury to the arteries. The right humerus is also dislocated. Chloroform being administered and extension made it was found that a tight band of skin beneath the head of the bone prevented its return. An incision about an inch long was made in this band of skin, pressure was then put upon the anterior surface of the astragalus and extension applied to the toes, when the dislocation suddenly disappeared. The dislocation of the humerus was reduced at the same time."

It was put in splints in the usual manner, and treated at first with the application of ice, afterwards with fomentations and poultices. Profuse suppuration set in, and finally, on account of the large amount of sloughing and some tendency to secondary hæmorrhage, it was found necessary to amputate.

August 11th.—Mr. Forster amputated at the knee-joint ; the patella was left ; a long anterior flap was formed, but no posterior flap ; one acupressure needle with wire was applied. An hour after hæmorrhage occurred ; the stump was opened and a second needle applied to a vessel near the popliteal. Oozing continued, so a sponge was put in and some strapping applied.

12th.—Sponge removed ; patient very low.

14th.—Needles removed by Mr. Forster about 2 o'clock, the wires being left in. About an hour after sudden hæmorrhage came on, and though not much more than half a pint of blood escaped, the patient died in about five minutes."

Description of the dissection performed twenty-four hours after death.—The stump was found already in a very sloughy and foul condition ; no union had taken place at the point of amputation. The anterior flap was rather discoloured, but whether from commencing gangrene or putrefaction (the weather being excessively hot) could not be told. The popliteal vessels to the extent of about five inches were removed from the stump. No other large vessel could be found, but two or three smaller veins were obstructed in the usual way with clot, which was either mingled with or was already softening down into pyoid material.

The artery and vein were both hardened in spirit and carefully slit up. It was then found that the artery in the whole of its extent was wrinkled transversely,—this was evidently due to the retraction of the vessel. About an inch above the patent end of the vessel there was a slight constriction, the whole of it below this point being also constricted ; this constriction probably corresponded to where the acupressure needle had crossed the artery. No adhesion had taken place between the adpressed surfaces of the inner coats. There was an exceedingly small amount of clot in the artery, only a little here and there adhering to the inner wall, and a small conical plug about half an inch long at the lower end ; this, however, did not fill the whole calibre of the vessel. There were traces, however, of a former larger plug having existed (which probably had been washed away in the last fatal hæmorrhage) in this circumstance ;—the artery was stained with blood pigment (as in those cases formerly known as aortitis, arteritis, &c.), for four inches of its extent, but only in about two thirds of its transverse diameter, leaving a channel through the other third, which corresponded to the openings of several medium-sized arteries. The pigment-stained portion was probably in contact with coagulum, from which the coloration resulted ; no vessel opened into it. A small channel was thus left, which conducted the blood as far as the last branch, which came off about one and a half inch above the amputated end of the vessel. This view was confirmed

by observing that above (where the clot may be supposed to thin out) the stained part of the artery diminishes in extent, while at the amputated end it goes quite round the vessel. The cause of the last fatal hæmorrhage may probably be ascribed to the severe illness which the patient had undergone prior to the amputation, by which the clot produced (upon which the hæmostatic influence of acupressure evidently depends) was of a more loose flaky character than usual, so that when the needle was removed it was unable to withstand the pressure of the blood column, and broke down and was washed away.

The internal surface of the vein is wrinkled longitudinally, thus showing just the reverse condition to the artery; this is probably due to the smaller amount of retraction which obtains in veins. About two inches of flaky clot fill the vessel, and there is a slight constriction similar to that of the artery about one inch from its amputated end. Just above this point the vein received a collateral branch, and through the clot a channel about one eighth of an inch in diameter was distinctly visible, leading from the branch to the open part of the vessel above. Here, as in the artery, no adhesion had taken place between the adpressed internal surfaces of the vessel.

Both artery, vein, and nerve were closely matted together as if by the formation of inflammatory tissue, so that the separation by dissection of these structures was difficult.

Thus no support is furnished by the post-mortem appearances in this case (one which is in the highest degree interesting from the short time elapsing between the acupressure and the fatal result) to the doctrine that the internal surfaces of the tunica interna cohere by adhesive inflammation like the serous surfaces of the peritoneum; nor are we aware of any published case or series of cases in which the doctrine has been indisputably demonstrated by post-mortem investigation. This fact is the more striking when it is considered that the arteries were quite healthy, and that the ordinary connective tissue surrounding the vessels and nerve had had time to take on an analogous action, as is evidenced by the matting together of these structures. The action of acupressure in arresting hæmorrhage seems to depend solely on the contraction of the part of the vessel to which the pressure of the needle has been applied, and of the portion below this, so that a conical clot is formed which

rests as it were wedge-shaped upon the contracted end of the vessel. Should the contraction be less perfect than usual, or should the clot from the nature of the case (as probably in this one) be more than usually flaky, then we are exposed to the risks of secondary hæmorrhage.

CASE 12.—Man, æt. 38, injury to foot, which had partly healed, but left a useless member. Chopart's operation; torsion to anterior tibial; four pins by the fourth method to other vessels; all removed in forty-eight hours; stump sloughed; patient ultimately did very well.

CASE 13.—Man, æt. 28, crushed foot; also compound comminuted fracture of left arm opening into the shoulder-joint; profuse hæmorrhage from posterior tibial had been going on for three hours before admission; patient blanched and very ill; amputation of leg on his rallying; four pins applied by the fourth method; two by the Aberdeen twist; removal delayed until sixty-eight hours from fear of hæmorrhage; none took place; death from pyæmia in three weeks.

CASE 14.—Woman, æt. 43, carcinoma of breast; amputation; torsion of five vessels; wound healed by granulation.

In five of these cases it will be seen that I have used torsion alone as the means of arresting hæmorrhage, and in one case it has been partially adopted—in all with the best success.

In many cases it has a great advantage over acupressure, but it is not always easy of application; nay, in some instances it is applied with great difficulty, and should a portion of the vessel perchance be torn off and hæmorrhage still go on, the further practice of torsion becomes exceedingly troublesome. It is impossible to say why the practice, adopted first by Amussat, was given up by the French surgeons—perhaps the difficulty of its application without chloroform may have been one reason, but I can scarcely imagine such to have been the case. In the few instances where I have used it there has not been any trouble in applying it, and certainly nothing that would induce me to abandon the practice on any such grounds.

The great recommendation for the employment of acupressure

has been generally asserted to be that thereby adhesion—entire or almost entire—of the whole of the wound would more frequently occur than at present, but on reviewing the cases which have fallen under my notice, in no one instance has there been an entire absence of suppuration, with such complete adhesion as I had been led to expect and hope for. I must confess here to a certain amount of disappointment. I hear it also stated by the warmest advocate of acupressure that torsion leaves a small piece of sloughy tissue in the wound which acts injuriously by preventing the entire adhesion of the surfaces. Supposing there to be truth in this statement, we are no worse off if we get no adhesion by acupressure than by torsion, and surely out of forty cases one or two at least might have afforded me a happy result. One of the undoubted advantages of torsion is the absence of a foreign body of any description in the wound. It is even simpler than the use of pins for twenty-four or forty-eight hours, and if it answers equally well I think it should be employed. But there are cases where I think the use of both means for arresting bleeding may be advantageous; the combined plan in the patient (No. 12) upon whom I adopted this double treatment for the arrest of hæmorrhage was more successful than torsion alone—indeed, there seems to be a greater trouble in applying torsion to the smaller vessels than to the larger ones.

Professor Syme and Dr. Humphry have now brought forward so many cases in which they have employed torsion that no one can believe for a moment that there need be the slightest fear of trusting a large artery thus treated; and from what I have done in the few cases mentioned, I believe it bids fair to realise the hope I expressed at the termination of my last communication, that some plan even more convenient than the pin and wire might be found as a substitute for them: such at present appears to be the result of torsion.

Experiments on animals are of little avail in establishing the security of the torted vessels—the French surgeons made enough of these trials many years ago to satisfy any one, and with the happiest results; yet the practice of torsion was abandoned by them because (so far as I can gather) suppuration occurred in the human subject along the course of the arteries.

I have not yet heard of any such result following the practice

at the present day. The time occupied in the performance of torsion is somewhat longer than that in applying the pin and wire, and in the smaller vessels there is, no doubt, considerable trouble sometimes experienced in applying torsion, and it may be advisable to have a pin and needle at hand so as to combine the two plans, as in the vessels of small size the pins can always be removed in twenty-four hours or less.

I have no hesitation in saying that two of the cases (No. 6 and No. 11) which have occurred this year have given me considerable anxiety as regards acupressure—the latter more especially, as the pin was kept in seventy-two hours with a view of preventing any hæmorrhage, and yet on its withdrawal so feeble was its hold that a sudden gush of blood took place. I should mention that the whole stump had sloughed, and whether the same result might have occurred with torsion (it most probably would eventually have done so with a ligature) I cannot say; probably any means would have failed, but as acupressure was under trial I was disappointed at its failure.

Some length of time must necessarily elapse before surgeons will be inclined to expose their patients to what, in the minds of many is considered a hazardous condition; there is a certain sense of security given in the case of a ligature being applied which affords to the surgeon a guarantee that for the present at least he will leave his patient in a safe state; but he forgets that there is a danger of hæmorrhage arising when that ligature is separating, probably as great as on the removal of the pin. Amussat described the inner coat of the vessel as being folded up, and this condition would appear to act as a preventive of bleeding equally secure with the plan of tying a ligature around the artery, and certainly more secure than acupressure.

During the last two years I have in no case used a ligature where any attempt has been made to obtain adhesion in a wound, nor where I have been able to practise torsion. It is thus difficult to see in what cases ligatures need be used at all.

POSTSCRIPT.—I am enabled to add to this paper, through the kindness of my colleagues Messrs. Poland and Durham, the two following cases which have occurred since the fore-

going pages were written. They afford further illustrations of the practice of torsion; both show that there is no necessity for ligatures even after amputation of the thigh. In Mr. Poland's case there was but very little discharge, and as near an approach to primary adhesion as could be obtained under the most favorable circumstances. In neither case was any portion of the arteries twisted off.

CASE 15.—A. B—, æt. 30, admitted under Mr. Poland's care in August 1868. Disease of left knee since April.

November 10th.—Amputation of thigh in middle third; three arteries were twisted; no other means for arresting hæmorrhage. Flaps were brought together by sutures.

A tourniquet was left on as a precaution, but not tightened; as there was not any hæmorrhage this was taken off the next day.

November 15th.—Sutures removed. Carbolic acid lotion dressing.

17th.—Very little discharge; flaps united except at their margins.

24th.—Patient able to leave his bed.

26th.—Margins of the flaps not quite healed. There has been scarcely any discharge since the operation.

CASE 16.—J. B—, æt. 43, admitted November 4th under Mr. Hilton's care. In March last injured his knee; suppuration into joint; great suffering.

November 17th.—Amputation by Mr. Durham of the thigh at junction of middle and lower thirds.

Torsion was applied to the vessels; no other means for arresting the hæmorrhage were used. Flaps brought together by sutures, which were removed in two days; no hæmorrhage.

23rd.—Flaps puffy and tender.

26th.—Flaps uniting in the centre; discharge healthy; moderate in quantity; general health good.

CLINICAL THERAPEUTICS.

By S. O. HABERSHON, M.D.

It is difficult to form a standard of health, or to define what health really is; for the normal condition of one person may be disease in another. Even if, in infancy, there was an equality of vigour, and the due performance of the functions of life, still every day would cause a divergence from that standard. Changes soon ensue, and serious deviations leave permanent traces behind them; those modifications which may be slight in themselves, by their frequent repetition soon become the fixed mode of life; the organism accommodates itself to a certain order of work, and the development keeps pace with this abnormality. If the defect be small, it may lead only to some peculiarity in adult life; but if it be greater, then healthy development is impeded, and a weakness of general constitutional power is the result. Some years ago a young man was brought into Guy's affected with a cold and bronchitis of an ordinary kind, but it was sufficient to disturb the balance of his circulatory and respiratory functions to such an extent as to destroy life. For twenty-nine years he had lived, and had attained to the full stature of manhood. By an opening in the septum of the heart a direct communication existed between the right and left ventricles, but no symptom had been manifested till four months before his death; a slight cold then produced fatal disturbance. With this patient the ordinary life had been one in which the balance of function had been so nicely adjusted, that the blood flowed on in its right course until there was an impediment in the lung, when the equilibrium was disturbed and never restored. A malady, which to one person would soon have subsided, became

a fatal illness to this young man from the congenital defect in his heart.

Again, the instances which my late colleague, Dr. Barlow, adduced some years ago of smallness of the trachea as a cause of general imperfect development of the lungs as well as of the whole system, may be cited to show how a state of weakness may be gradually induced, and become the permanent habit of the individual. In these conditions, whether of congenital or infantile origin, new ailments demand most cautious treatment. But there are other constitutional deviations from the healthy standard which to the physician afford important guides to right treatment as well as to a correct diagnosis; we refer to the weakness from inherited strumous disease, to the nutritive modifications from congenital syphilis, to the susceptibilities in patients whose parentage predisposes them to gouty disease, to the peculiar management required by those whose nervous system is unusually prone to perverted action from transmitted morbid tendencies. The *family history* of a patient is of as much importance in directing the treatment of disease as it is in guiding us to a correct diagnosis.

It is not sufficient to recognise the malady with which the patient is immediately affected, without taking into consideration also his *antecedent conditions of actual disease*. The want of investigation into the previous history is perhaps a more fertile source of error in the treatment of disease than any other, and for this reason the knowledge of therapeutics that may be derived from books is a poor substitute for that which is acquired at the bedside.

1. The antecedent disease may become perfectly quiescent.
2. It may induce certain modifications of all future morbid actions.
3. It may have destroyed the integrity of some vital organ.
4. It may be of a progressive character.

A. S—, a delicate little fellow aged 6 years, was admitted under my care on September 2nd. He was very ill; the poor mother had given up hope of his recovery, believing that he had advanced phthisis. Three months before admission he had been out to a Sunday school treat, and had taken cold; he had become thin and exhausted, with shortness of breath, and

slight cough. Recently pain had come on ; below the left nipple there was a red and tender swelling about the size of a pigeon's egg, which evidently contained fluid. The whole of the left side of the chest was dull on percussion ; the side was fixed, the intercostal spaces were plane, or slightly convex, and that side appeared larger ; the heart was found to pulsate on the right side ; on the left also there was loss of tactile vibration, with bronchial respiration and voice ; the respiration was puerile on the right side ; the liver could be just felt ; the pulse was irritable, but there was no indication of other disease. The child had had measles when an infant, but had suffered from no other malady. The diagnosis was clearly made out ; empyema had supervened upon simple pleurisy, and the abscess below the left nipple was the passage outwards of the pus contained in the pleura. The abscess was at once opened ; steel wine and some good nourishment were given, and marked improvement took place in a few days. At first the purulent discharge was scanty ; it soon became very free, but at length almost subsided. The left lung had, however, become so bound down by firm fibrinous investment that no expansion took place ; the heart returned to its proper position, but as the pleura emptied, the ribs came together and the shoulder was depressed ; in a short time the left side was an inch smaller, instead of being larger than the right. The child left the hospital convalescent, and would soon, we believe, be free from active disease. If after a time this child be seen by a stranger, it may seem as if the spine had been diseased, producing curvature ; and rigid appliances may perhaps be directed to give support. This could only arise from ignorance of the previous history, for the depression of the shoulder, the contraction of the chest, and the curvature of the spine were caused by the firm compression of the lung by adhesions, and its consequent non-expansion. If, again, the child should subsequently become affected with chest disease (as bronchitis), in the now sound lung, a stranger might attach more importance to the vestiges of the old disease than the case would warrant, the contracted chest having become the normal condition of the patient. In other cases changes or defects become persistent ; a limb that has ceased to grow during childhood, whilst other parts have advanced in regular development, thus remains during the whole of life, and no one would

think of subjecting the patient to medical treatment on that account.

There are also previous diseases which may leave the system in a different condition, by changing the character of the blood; or it may be that the whole nutritive process, in whatever that may consist, has been modified, and the effect is indelible. Vaccination, if properly performed, produces such an atomic change in the organism that its impression is never effaced. So also after syphilis; the subsequent perversions of nutrition undergo a peculiar development, and there is a tendency to fibroid deposit and disintegration. A well-marked attack of miasmatic fever or ague modifies all subsequent ailments. Whatever diseases may occur, whether trifling or severe, they have a periodicity which is the result of the old aguish mischief, although forty years may have elapsed since it took place.

Another form of antecedent disease injures the integrity of some organ, and produces a defect which no subsequent treatment can remove. The system becomes accustomed to this altered state, and the object should be to maintain the equilibrium that has been restored, rather than to resort to fruitless attempts to remove an irreparable injury. One or two instances will best illustrate this statement. A young patient may become affected with local inflammation at the apex of the lung, and although the active mischief may have subsided, traces of the former affection may be left in an adherent pleura, with increased density of the lung tissue, whilst other portions of the respiratory organs remain sound. Good health is apparently restored, and the object should be to protect the weakened part from fresh excitement, and to place the sound lung in the most advantageous position for the performance of its work. It would be unwise to persevere in attempts to restore the irreparable injury, and the efforts unwisely directed might increase the mischief by causing disorganisation; and, what is equally important, in the event of a fresh attack of bronchitis or inflammation, the fact should be kept in view that a new disease is engrafted upon an old one, lest the remedies be too vigorous, and the patient suffer in consequence.

In disease of the heart, even of an organic kind, as defect of the aortic or mitral valve, the circulation may be so maintained that the patient may be scarcely conscious of injury; and the

object should be, not to assail or weaken the already crippled valve, but to place the circulation in the most easy position, and to lessen the strain upon the enfeebled part.

The same remark is also applicable in chronic disease of the kidney; there may be organic damage to one portion of the gland, whilst another is maintaining its functional integrity. The presence of albumen in the urine may be due to a passive transudation from a weakened part, whilst other portions are vigorous in action. It is often a better plan to recognise what has become a permanent defect, and to promote, if possible, the healthy activity of the sound part, at the same time diminishing its work, rather than by too active treatment to lessen the power of the patient. The treatment which may be most judicious in acute disease thus becomes inappropriate in a malady which has become stationary and irremediable. Clinical therapeutics teach this lesson to the observer. But beside these previous ailments which have become quiescent, or have modified the working of the organism, or have spoilt some part of that organism, there are others which are essentially progressive; more so than the class we have just referred to: in them it is possible that equilibrium may be maintained; in these the disease is in itself an advancing one. The degeneration of vessels from increasing years does not cease; cancerous diseases go on when glandular organs have become affected; probably, also, lardaceous disease of the organs, and tuberculosis. There may be intervals of rest, and other ailments may supervene, but the first slowly progresses, and the strength is more and more undermined.

It might almost be said, that no one is typically in sound health; former diseases have left their trace, and in most cases we have to do with a complex resultant of morbid forces, if such a term may be employed. A few instances from patients in Guy's will show these modifying circumstances, and exemplify the adaptation of treatment. The following considerations may be laid down as general rules for our guidance.

I.—*The successive stages of the same disease are very apt to be mistaken for new ailments.*—Clinical study shows the danger of this error, and, unless the morbid action in its real character be kept in view, the treatment will consist in futile attempts to relieve symptoms as they arise. Thus, in the following case, a

young man exposed to the influence of lead becomes affected, first with colic, then with weakness of the hands, with rheumatism, then with increased muscular weakness and epilepsy, all the result of the chronic poisoning by lead. It would be incorrect to designate these various conditions as so many separate diseases, whilst they are only the manifestations of the effects of the same poison in increasingly severe degrees; and the treatment should consist in freeing the system from the lead and in strengthening the parts damaged by its influence.

Lead poisoning will produce cerebral disturbance and epileptiform convulsions, and it also affects the glandular organs, the liver and the kidney, but it may be doubted by some whether the lead alone would induce so marked an action on the kidney as to cause uræmic poisoning.

Lead colic ; dropped hand ; saturnine rheumatism ; epilepsy ; uræmic poisoning ; recovery.

James C—,¹ æt. 27, a painter, from Sevenoaks, was admitted June 30th, 1868; he had been employed at painting for nearly seventeen years, and had had colic six or seven times, the first time being ten years ago. His former attacks were generally attended with severe griping pain about the umbilicus, but the constipation was overcome by a dose of castor oil. Eight years ago he experienced slight weakness of the hands, but he perfectly recovered. The present attack came on two weeks before admission, with vomiting, cramps in the legs, severe griping abdominal pain and constipation; a week later he noticed his hand becoming weaker, and after a day or two he had pains in the shoulders and down the arms. He had rheumatism a year ago, but no syphilis. He was fairly nourished on admission, but the muscles of the forearms, both flexors and extensors, were wasted. There was a well-marked lead line on the gums. The chest was normal, the abdomen was rather contracted and somewhat tender. The urine had a sp. gr. of 1017; it was free from albumen, and there was no reaction with hydro-sulphuric acid. The colic became very severe, but was relieved by croton oil with opium, and by belladonna and chloroform applied to the abdomen. Iodide of potassium with carbonate of

¹ Reported by Mr. G. E. W. Turner.

ammonia was then given. Three days later restlessness was followed by coma, and involuntary discharge of the evacuations.

On July 6th, he was semicomatose; pulse 160, weak and fluttering; pupils natural and sensible to light. On the following day, at half-past seven in the morning, he had a fit, during which he foamed at the mouth and clenched his hands. A blister was applied behind the ears, and a turpentine injection was administered. Some urine drawn off by a catheter had a sp. gr. of 1014, and contained both albumen and sugar. He was ordered gr. vi of the compound elaterium powder (Guy's). On the following day, July 8th, he was sensible, but unable to speak, although he seemed anxious to do so; the pupils were sensible to light; bowels freely opened; pulse 94.

9th.—He was quite sensible; the surface of the body was tender; pulse 100; the urine, sp. gr. 1013, still contained albumen, with a trace of sugar.

On the 10th the sugar had disappeared from the urine and the albumen was less: this also soon disappeared. The patient slowly convalesced and left the hospital in September, although the arms had not quite regained their power.

In the following case the connection of the symptoms with a single cause is, perhaps, more doubtful; disease in the ear may have been the cause of the headache, meningeal irritation and epilepsy, which were relieved by the discharge of pus; and the rheumatic symptoms may have been due to a form of chronic pyæmia rather than an independent disease. We have seen pneumonia produced by pyæmia in connection with disease of the ear, and also by gonorrhœa, and therefore we regard this supposition as the probable explanation.

Cephalalgia; disease of the ear; rheumatism.

Caroline P—, æt. 50, a housemaid, was admitted on July 22nd, 1868. She was a short woman and rather stout, and had been well till five weeks before admission, when she had two epileptiform seizures followed by severe pain in the head, and by great excitement, even semi-maniacal. There was vertigo, but no deafness. Three weeks later, two before admission, severe pain came on in the region of the right temporal bone; there was no rigor, but almost constant pain, which continued per-

sistently. There was no evidence of disease of the chest or abdomen. The skin was cool, and the senses perfect. She was ordered iodide and bromide of potassium. The pain, however, continued unrelieved, depletion was tried by my colleague, Dr. Moxon, and afterwards counter-irritation, &c. On October 16th discharge of pus took place from the ear, and the pain in the head ceased. The discharge also soon subsided, there was no deafness; but in a few days severe pain and redness came on in the joints, with acid perspiration and great prostration of strength. The symptoms at once suggested the idea of rheumatism or pyæmia, but with quinine, &c., and sustaining diet, she slowly rallied. During the severity of the attack, however, there was delirium and involuntary action of the bowels, and other signs of great prostration; but there was no evidence of pulmonary nor of cardiac complication, nor of fever.

II.—Another important consideration in the treatment of disease is, that *acute changes in the system are always modified by former diseases.*

Typhoid fever runs its usual course in strumous subjects, but the convalescence is very slow, and there is greater danger of chronic peritonitis. We have lately had a little child in the hospital whose convalescence was extended over nearly three months on that account, and in a second case the severity of the colic, diarrhœa, and pain many weeks after the termination of the fever led to some fear as to the result. Again, in excitable conditions of the nervous system, the onset of the fever is characterised by sleeplessness and delirium, and the fear of early exhaustion is greater.

Rheumatism also is always more obstinate after syphilis. In the following case the bronchitis was most severe, but if any one had been called to treat it, and had regarded it simply as an independent affection, the treatment would probably have hastened the fatal termination; the acute bronchial attack was the result of the coldness of the ward, and was not the mere œdema of the lungs and bronchi so often associated with renal disease.

Alcoholismus; albuminuria; delirium tremens; bronchitis.

Joseph S—, æt. 52, was admitted on October 14th, a painter

by trade, and of very intemperate habits. Several times he had had delirium tremens, and had scarcely recovered from an attack when he came to the hospital. For three weeks there had been slight anasarca of the lower extremities; the liver could be felt; the abdomen was partially distended; and there was dulness in the region of the colon, and at the depending part of the abdomen; the heart was feeble; the urine was highly albuminous; the tongue furred; the countenance anxious, with some capillary congestion of the cheeks. He was ordered saline mixture with henbane. After being in the hospital for a few days, very severe capillary bronchitis came on with prostration, and it was necessary to give stimulants with ammonia and senega, &c. He partially rallied, but subsequently sank, and on inspection the liver was found cirrhotic, the kidneys coarse and congested.

III.—It may be almost regarded as a law, that the *intensity of the influence of the former malady lessens according to the interval of time since the attack*. Thus, in a patient who has become affected with rheumatism, and who may have had syphilis and ague, the ailment will be proportionately relieved by iodide of potassium, or by quinine, according to which attack took the precedence of the other. If he had ague at twenty, syphilis at thirty, and rheumatism at forty, the iodide would be the more effective remedy; if the syphilis and the ague be transposed, then the quinine would be the more applicable. We have several times found that, many years after an attack of intermittent fever, there is a periodicity of the symptoms which is referrible to the former attack. In a case presently to be mentioned, a man with hemiplegia after habits of intemperance and sunstroke, died from extension of disease to the other side of the brain; there had been no evidence of syphilis, but fibroid degeneration of the testicle was found after death, and we must regard this syphilis as an additional cause of degeneration of the vessels of the brain.

Intemperance; sunstroke; hemiplegia; old syphilis.

M. M—, æt. 40, was admitted under my care into Guy's on September 23rd, 1868. A strong man, of dark complexion

and muscular frame; his occupation had been that of a fireman on a steamer, and he had drank immoderately. During July, whilst at Odessa, he had sunstroke, and was insensible for twenty hours, the attack being followed by headache and vertigo, but he remained free from paralysis. He recovered from this illness, and returned home. On September 20th he was intoxicated, and on the following day suddenly became insensible, and paralysed on the left side. On admission he was conscious, and could speak imperfectly; the left side of the face was partially paralysed, and the tongue was protruded slightly towards that side; the pupils were small and active; there was no bruit about the heart, nor other evidence of disease. Some would have suggested local depletion, free purgation, and perhaps mercurial medicines in this case; but we had several sources of depression of the nervous system, and the treatment consisted in quiet rest, unstimulating diet, gentle action on the bowels, and the ammonia mixture of the hospital; after a few days iodide of potassium was added, he continued steadily to improve, and was able to be about the ward, till November 8th, when hemiplegia on the right side came on, and he quickly sank comatose.

On inspection, old softening was found at the right corpus striatum, the cause of the hemiplegia on the left side. On the corresponding part of the left side of the brain there was also extensive recent softening, the explanation of the fatal attack. The vessels of the brain were diseased and obstructed, and there was a small aneurism of the basilar artery. The testicles presented fibroid deposit, probably from syphilis. Other structures were normal.

In this case we had several causes of damage to the vessels of the brain; intemperance, syphilis, and sunstroke; as a sequence the vessels became diseased, and by the interference with the circulation the nutrition of the brain was damaged. In such an instance of disease how little service would have been rendered by mercurial medicines and depressing measures: they would only have hastened the fatal result.

IV.—*If two diseases concurrently affect a patient, the one modifies the other in an important manner.* Although disease may be only a modification of the normal elements of the living organism, yet the body may at the same time be assailed by two

or more morbid forces. In this statement we do not refer to the different stages of the same disease, as pain in the limbs preceding the more evident symptoms of spinal disease, nor to albuminuria and dropsy following obstructive disease of the valves of the heart. The concurrence of morbid actions leads to increased exhaustion, as well as to modification of the symptoms of disease; thus, in the following case of typhoid fever, succeeding bronchitis and rheumatism, there was greater prostration than would have been expected from fever; and in the one with cancerous disease of the œsophagus, rheumatism led to a suddenly fatal aggravation. Again, in another patient, severe rheumatism became a serious addition to the distress and weakness consequent on acute and chronic bronchitis.

Bronchitis ; rheumatism (?) ; typhoid fever.

Susan M—, æt. 16, was admitted October 20th, 1868. Till two years ago she had enjoyed health, but during several winters cough had come on. On the return of colder weather the cough reappeared and she felt weaker than usual. On October 17th she experienced faintness, vertigo, frontal headache, and with the cough, slight hæmoptysis. The bowels were confined, menstruation had been irregular. On admission the face was flushed, the ancles were swollen, there was evidence of bronchitis in the prolonged expiratory murmur, with wheezing sound, and sibilus and rhonchus. At the lower lobes there were mucous râles, the right side was the worse; there was, however, no dulness on percussion. The skin was hot and moist, the pulse 120, compressible; respiration 52; the tongue clean. Acetate of Ammonia mixture, with tincture of henbane, was ordered.

On the following day, the 21st, there were the same febrile symptoms; the pulse 124; respiration 52; the temperature 104·8°.

On the 24th there had been diarrhœa, the abdomen was rounded. There were several rose-coloured maculæ on the abdomen, but there was acid perspiration with miliary vesicles on the chest; the tongue was clean, but there was great prostration. During the week the temperature continued high, 103—104°; the bowels occasionally loose, maculæ were distinct, the tongue clean; pulse very compressible: on the 31st 144 per min.; re-

spiration 52; temperature 103·4°. Brandy and wine were given freely, and quinine gr. ij, with ammonia in effervescence with citric acid every four hours.

On November 7th, the twenty-first day of the fever, the temperature was 101°, countenance more intelligent, tongue clean, the voice a whisper, bowels quiet, the pulse more distinct, cough better. In fact she was slowly convalescing.

On the 9th the temperature was only 98°, but on the 12th pain in the course of the left femoral vein came on, with swelling of the leg; the vein was evidently obstructed; the temperature again rose to 101—102·8°, but subsided on the 12th, and she then rallied steadily.

In this interesting case chronic bronchitis had become aggravated by an acute attack, when symptoms of typhoid fever were developed; the bronchitis was not the congestive affection so frequent in fever, but an old and independent affection. At the onset of the fever there was some swelling of the ankle, with perspiration of the skin, and afterwards miliary rash. Typhoid spots then became manifest, with diarrhoea and prostration; the tongue, however, remained clean. Typhoid symptoms sometimes appear during acute rheumatism; this affection was evidently not of that kind, as shown by the rose-coloured spots and other symptoms. It is possible that with the bronchitis and fever, concurrent diseases, a third might also be conjoined, namely, rheumatism; although there still remains a doubt whether there was really any true rheumatism, or whether there had been miasmatic poisoning to produce the free perspiration. As the febrile symptoms predominated, the cough lessened, and the pain in the joints subsided; and we began quinine during the second week with apparent advantage.

Cancerous disease of the œsophagus; rheumatism; sudden coma.

Robert P—, æt. 58, a shoemaker, was admitted on September 30th; he was a tall emaciated man, with a haggard countenance. For three months he had suffered from dysphagia, which had greatly increased, so that he was quite unable to swallow anything solid; but he could take milk and other forms of fluid food. These fluid articles of diet were not returned, but produced

pain at the end of the sternum and at the pit of the stomach. If the patient avoided solid food he had no vomiting, but he always complained of pain; no growth could be felt. The heart's action was feeble; the chest was healthy on admission; and there was no albumen in the urine. A probang had previously been passed into the stomach without meeting with any obstruction. Milk and eggs, &c., were allowed, and cod-liver oil, but after a short time he was unable to take the oil. On October 8th Mr. Bryant passed a probang seventeen inches without meeting with any impediment. Still no improvement followed, opium and bismuth were given to quiet spasmodic action, but the progress of the case tended to confirm the diagnosis of cancerous disease at the cardiac end of the œsophagus.

On the 29th he complained of severe pain in the neck resembling rheumatism; there were slight febrile symptoms. Belladonna and chloroform liniments in equal proportions were applied on spongio-piline, and afforded great relief.

On the 31st the pain in the neck was relieved, but he complained of soreness in the mouth, and the right wrist was swollen and red like a rheumatic joint. He was ordered Chlorate of Potash, gr. v, in water every four hours. On the following evening he was suddenly seized with an attack resembling apoplexy and quickly sank.

On inspection, Dr. Moxon found cancerous ulceration at the extremity of the œsophagus slightly protruding into the stomach; the pleura was affected on the right side, the disease just reaching the serous membrane. No evidence of effusion into the brain, nor of softening, nor of embolism could be found.

An attack of rheumatism in this patient came on in the usual manner, and there was nothing to indicate that the pain in the neck and the swelling of the wrist were other than ordinary rheumatism; the symptoms were not those arising from blood changes connected with sloughing disease. The pain in the neck was relieved by the belladonna and chloroform; it was doubtful what was the cause of the coma and sudden termination in this case; but there was evidently a second malady hastening the fatal termination of the cancerous disease.

Chronic and acute bronchitis ; rheumatism.

Julia R—, æt. 47, was admitted October 21st. A stout woman, who had had rheumatism for five weeks, the joints being red and swollen, and the skin perspiring. She had had cough for two weeks, but for several years had had winter cough ; the heart sounds were roughened.

She was ordered conium juice with carbonate of soda every four hours. The rheumatism quickly subsided, but the bronchitis continued very severe, as shown by the urgent dyspnoea, the congestion of the countenance, the general mucous râles heard in the chest ; there was free perspiration. Ammonia, senega, and nitric ether were prescribed, and wine.

The severity of the attack slowly passed off ; but in this case the bronchitis soon masked the rheumatism ; both maladies were probably due to the same exciting cause.

V.—An *acute general affection has a more powerful effect than a local one*, and the latter may often be disregarded. Thus, pneumonia or bronchitis coming on during an attack of typhoid fever would not call for any marked change in the treatment beyond extra warmth, &c., to the chest ; and in other cases, not, however, quite of a parallel kind, we may act in a similar manner. During acute rheumatism it is very frequent to have pain in the chest and pleuritic effusion, but it is, we think, an unwise plan to treat it as it were separately, and to give mercurials, to apply repeated blisters, &c. Like the effusions into the joints the serum very frequently becomes rapidly absorbed without any direct treatment. In the following case, during an attack of ague, acute inflammation of the cornea came on, the eye having been previously affected by syphilitic iritis ; and although it is well known that in asthenic forms of disease quinine is often of the greatest service, still in this local inflammation, if unconnected with ague, we should not have given quinine.

*Quotidian ague ; acute on old inflammation of the iris
and cornea.*

R. S—, æt. 33, a sailor, was brought to Guy's affected with

quotidian ague; at the same time it was found that there was acute inflammation of the left eye. A zone of congested vessels existed around the cornea, and there was a deposit of pigment on the lens; increased dulness in the left hypochondrium showed some splenic enlargement. Three grains of quinine were given every four hours; the ague quickly disappeared, and with it the local inflammation of the eye. There was no necessity here to administer mercurials or to apply leeches, &c., to the temples; with the subsidence of the miasmatic fever the local inflammation ceased. Many other instances of a similar kind might be adduced.

VI.—It is now so well known and recognised that we will only advert to the fact that *local disease, especially when symmetrical in character, is the expression of a constitutional malady, and must be treated accordingly.*

VII.—When we attempt to *relieve organic local disease by diminishing its more prominent symptoms* great care must be taken lest the *original malady be increased.* Thus, in disease of the mitral valve with obstruction, the current of blood is interfered with; the lungs become engorged; the right side of the heart is overfilled; the liver is enlarged from congestion; the distension of the portal vessels leads to ascites; the impeded renal circulation produces scanty and albuminous urine; the retention of the blood in the cerebral vessels disturbs the functions of the brain: the question then naturally arises—What means have we by which this condition can be alleviated; the cause, the organic defect of the valve, must remain, but still we may lessen the cardiac obstruction by diminishing the secondary congestions caused by that primary disease; and this may be done by free action on the bowels, and on the abdominal glands. We possess in the preparations of mercury very powerful means of effecting these desirable objects, especially when combined with foxglove and squills; but great care is required lest in lessening the secondary maladies we increase the primary one. Mercury promotes degenerative changes, and in several instances we have seen great relief followed by subsequent exhaustion, and have found that the damaged valve had undergone recent ulceration; and we believe that this degeneration was aggravated, if not caused, by the mercurial action upon the system.

The mere treatment of symptoms is an unscientific method of relieving disease, and is often both hazardous and injurious. Inflammation of the cæcum and the adjoining parts affords us another example of the truth of the statement just made. The prominent symptoms are severe pain in the right iliac region, with fulness, hardness, and diminished resonance on percussion; there is febrile excitement, the bowels, whether they had been relaxed or the reverse previously, become confined, and vomiting is often also present. The ailment consists in inflammation of the mucous membrane of the cæcum and appendix, which inflammation extends to the muscular and peritoneal coats of the intestine, and ulcerative perforation may take place at the earlier or later stages. During this attack the secretion from the mucous membrane is altered, it being sometimes covered by a diphtheritic membrane, and the fæcal contents adhering to it; the muscular coat loses its contractile power, and the intestine, as a consequence, becomes distended, and we find the hardness and swelling previously mentioned. If the peritoneum have become affected, it is most important that the peritonitis should remain localised. If the *symptoms* be treated, as they too often are, the case is regarded as one of obstruction from retained fæcal matter, and purgatives are prescribed to relieve the constipation; these medicines increase the pain, they irritate the inflamed membrane, augment the obstruction, and very frequently produce vomiting. If any fluid fæcal matter pass it only affords very temporary relief; but if we can *lessen the inflammation* of the coats of the bowel, then the secretions are restored, and the contents propelled onwards naturally.

So also in reference to the action of mercurials in cæcal disease; it is quite true that they act beneficially upon the abdominal glands, but they also promote the disintegration of fibrinous effusion; the fibrin effused about the appendix cæci is often the best preventive against general and fatal peritonitis, and the calomel would be the most effectual means of preventing this natural localisation of the disease. Opium or morphia in one or other form, either by the mouth, the rectum, or hypodermically, is a better remedy when given alone, than with the addition of mercury; purgatives should be entirely avoided even in the form of the simplest enemata; the application of warmth and

counter-irritation are beneficial, and absolute rest should be enjoined.

We might add another example in the treatment of apoplexy. Too often in attempting to promote the absorption of effused blood, degenerative changes around the clot are promoted, and the recovery is really retarded. It is better to leave the system to its own reparative strength than to exhaust by *repeated* powerful purgatives, and by mercurial action; chronic atrophic softening around a clot is a greater injury than the localised clot itself.

VIII.—*Any true antagonism of disease is very doubtful*; prominent symptoms may become masked and lessened, whilst the disease remains. The cough of phthisis may subside and almost cease during severe diarrhoea, but the disease makes progress. It is well always to examine the chest carefully in chronic exhaustive disease of the abdomen; the feeble state of the patient may permit him to breathe calmly with less than half his usual respiratory apparatus; and many chronic affections are found to be accompanied with thoracic disease; not only does the quietness of the respiration tend to mislead, but if the disease be diffused, if there be strata of intervening respirable lung, and again, if with these conditions a vomica be filled with mucus and very little air pass into it, unusual care is required in diagnosis. Not only do these remarks apply to strumous disease of the intestine, but to other conditions. Thus in chronic disease of the kidney, diarrhoea from oedema and ulceration of the mucous membrane produces exhaustion; the lungs become anasaruous, and a vomica may easily be overlooked, if filled with serous fluid; we have witnessed such cases, even when examination has been made by those in whom we had confidence.

Still there appears to be an antagonism of morbid action, which we often make use of to relieve disease; as in the several forms of counter-irritation, &c., but this whole subject requires fuller and deeper research. So also the subject of the correlation of forces as applied to the human system and to morbid states; this field of research will repay those who can investigate it as it deserves. We have made these remarks on therapeutics from the thoughts that are continually suggested in clinical

teaching; and it is as futile to expect that therapeutics can be acquired by the study of books and lectures as it is that the ability to diagnose disease may be attained by these means.

IX.—Another consideration of universal application is *that the surrounding circumstances of the patient should conduce, if possible, to the restorative process*. The law of rest to an injured part—of such general importance in surgical practice—is not of less consequence in the practice of medicine; that a fractured limb or a strained joint should require repose needs no comment, but the physician has great difficulty in enforcing the same rule in disturbed or irritated internal structures. In how many states is it essential that the brain should be quiet, and the senses of sight and hearing be left undisturbed, but how difficult oftentimes to carry out the requirement.

In acute bronchitis or inflammation of the lungs the mere medicine will be of very little avail if the diseased structures be still further irritated by cold air, and if the usual supply of food excite the heart and lungs to their wonted activity. The work of the lungs must be lessened by a diminished supply of carbonaceous aliment, and warm pure air be permitted to soothe the weakened parts.

In acute diseases of the digestive organs the same law applies; in very many instances the mucous membrane of the stomach, irritated or inflamed by improper diet, will soon recover its power, if allowed to rest. Unfortunately, the sense of exhaustion, which is one of the symptoms of the disease, induces the patient to increase the mischief by again taxing the energies of the weakened organ.

In acute disease of the kidney, as in the albuminuria of scarlet fever, we may reduce the activity of the damaged gland by keeping the skin warm, by acting freely on the bowels, and by lessening the quantity and regulating the character of the diet.

Still more important are these considerations, when there is some general source of disturbance operating upon the powers of nutrition; in typhus, in erysipelas, in the exanthems, in unhealthy suppurative disease, in diphtheria, &c., pure air, cleanliness, nourishing diet, are essential elements of right treatment. In the stagnant air of unhealthy wards cry-

sipelas will spread, the tendency to repair in suppurating wounds is checked, and fever attacks those who are exposed to its influence. In wards where beds are closely aggregated together, numerous instances are presented of the terrible effect of stagnant and contaminated air; not only does typhus spread, but the simple application of a blister is followed by erysipelas, and the recovery of weakened patients is generally retarded. It is the first duty of those concerned in the treatment of the sick to secure the most favorable circumstances for the exercise of the vital functions, whilst the damaged structures are allowed to rest so as to recover from the effects of disease and injury.

We would impress upon our readers the importance of the considerations which we have briefly enumerated, for although they have long been recognised in the diagnosis of disease, they are often overlooked in its treatment.

I. That successive stages of the same disease are very apt to be mistaken for new ailments.

II. That acute changes in the system are always modified by former diseases.

III. That the intensity of the influence of the former malady lessens according to the interval of time since the attack.

IV. That when two diseases concurrently affect a patient, the one modifies the other in an important manner.

V. That a general affection has a more powerful effect than a local one; but,

VI, that local disease, especially when symmetrical in character, is the expression of a constitutional malady.

VII. That when we attempt to relieve organic local disease by diminishing its more prominent symptoms, great care must be taken lest the original malady be increased.

VIII. That any true antagonism of disease is very doubtful.

IX. That the surrounding circumstances should conduce, if possible, to the restorative process.

A CASE
OF
EPITHELIOMA OF THE OESOPHAGUS
IN WHICH
GASTROTOMY WAS PERFORMED;
WITH REMARKS.

By ARTHUR E. DURHAM.

THE result of this case was not satisfactory. To some it may seem anything but encouraging. Nevertheless, I think it right to publish the following details. They may serve, at any rate, to illustrate forcibly two points already recognised but often forgotten. These are, first, that a patient hopelessly dying of starvation is, as a rule, ready to accept—nay, even to welcome—the barest chance of relief; secondly, that the operation of gastrotomy may be performed with comparative facility.

I am indebted to Mr. Alfred Ashby for notes of the case, and to Mr. Reginald Stocker and to my dresser, Mr. Chalmers, for the attention with which they watched the patient.

CASE.—A. T—, æt. 70, was admitted into Stephen Ward, Guy's Hospital, under the care of Dr. Wilks, 19th August, 1868.

For some months past the patient had been troubled at night by a constant desire to expectorate. The saliva appeared to be

swallowed properly, but rose again into the throat and mouth. Since June he had not been able to keep down any meat; the portions which he swallowed were immediately brought up again. But between that time and a fortnight previous to admission he had been able to take very small pieces of bread and eggs, and liquid food. Within the last few days he had become altogether unable to keep down food, with the exception of a little wine. His inability to swallow his saliva had become a constant trouble. There was no history of cancer in his family.

On admission it was observed that the patient had become very much emaciated. His extremities were thin, and pale, and cold; his face was sunken; his abdomen seemed pressed in. He complained of pain in the spine, between the shoulders and over the sternum. He had no pain in the back before the difficulty of swallowing came on. The pain did not appear to be increased by pressure, nor even by a smart blow. He said it felt to him as though the obstruction to swallowing were opposite the lower part of the sternum. He could feel distinctly when a particle of food passed the obstruction. When this occurred he had no sickness. The more superficial arteries could be plainly seen pulsating. Pulse 72. Impulse of the heart weak. Tongue very much furred. The sternum appeared somewhat deformed. The ribs were very prominent.

For some days after admission he was able to get down small quantities of milk, beef tea, and wine. He gradually became weaker however, and soon began to complain of cough.

On the 10th of September he was unable to swallow anything. Even water taken in small quantity was immediately returned. His breath was noticed to be very offensive.

On the 11th September he was examined by Mr. Durham. A bougie (small size) was passed into the œsophagus, but was absolutely arrested by a firm obstruction, about three inches below the level of the cricoid cartilage. Nothing like cancerous stuff was brought up on the bougie. On consultation with Mr. Hilton and Mr. Cooper Forster it was decided that an attempt should be made to nourish the patient for a few days by enemata of beef tea, &c., administered five or six times a day.

The enemata were not retained well. The patient continued

to get rapidly weaker, and was very anxious that anything that could be suggested for his relief should be done.

On the 15th September Mr. Durham performed gastrotomy. Chloroform was administered in accordance with the patient's desire.

An incision three or four inches in length, extending downwards from the cartilages of the eighth and ninth ribs, and immediately over the left linea semilunaris was made through the integuments. The aponeuroses of the abdominal muscles and the fascia were then divided on a director to a corresponding extent. The outer border of the rectus muscle was just seen. One vessel required ligaturing. The peritoneum was then opened to the extent of two or three inches, and the great omentum was seen lying in front of the intestines. Gentle traction upon the omentum, and upward extension of the opening into the peritoneum, readily brought the stomach into view. Two stout ligature silks were next passed, by means of curved needles, through the anterior wall of the stomach, so as to include the part selected for the opening. This part was midway between the greater and lesser curvatures, and as near the cardiac end as practicable. The silks were passed from left to right, and one was about an inch above the other. The points of entry and exit were in each instance about an inch apart. The anterior wall of the stomach was then drawn forward by means of these ligature silks, and an opening, an inch or more in length, was made through it, in a perpendicular direction. The ligature silks were then divided in the middle, and made use of as sutures to attach the stomach to the edges of the opening through the abdominal parietes. Numerous other sutures were put in. Every care was taken to adapt, accurately, the cut edges of the mucous membrane to those of the skin. The stomach was attached to the extreme upper part of the incision; indeed, it was found necessary to extend the first incision somewhat upwards and towards the middle line in order to avoid traction upon the stomach. The lower part of the wound was closed by several sutures.

When the stomach was opened there was a slight attempt at vomiting, and a small quantity of dark brown fluid escaped. None of this, however, was allowed to get into the peritoneum. After the operation was completed, some warm milk and

water was introduced into the stomach by means of an elastic tube passed through the opening. Efforts at vomiting were excited, and the milk and water was immediately ejected, mixed with a quantity of the dark brown fluid mentioned above. It was deemed advisable to defer, for a short time, any further attempt to introduce food into the stomach. Strips of lint were applied round the edges of the wound; a soft sponge was laid over all, and secured by adhesive plaister.

The patient was taken back to bed about 4 o'clock p.m. He was in a very low state. Pulse very feeble, 70. Surface of the body cold. Warm blankets were put round him and hot-water bottles placed in his bed. In the course of an hour or two he rallied considerably; the pulse improved; the surface became comparatively warm.

At 7 o'clock p.m. an enema (consisting of six ounces of beef-tea, one ounce of brandy, and eight minims of laudanum in half a pint of arrowroot) was administered. He expressed himself as feeling comfortable.

About 8 p.m. he sucked a little ice. This caused him to retch. Some biliary matter was vomited through the opening. The dressings were therefore removed, and a warm sponge and steaming flannel were applied over the wound.

About 9 p.m. he had a little shivering.

At 9.30 p.m. a third of a grain of morphia was injected subcutaneously.

At 10 p.m. he complained, for the first time, of a dragging pain about the epigastrium. He had had no more shivering, nor had he vomited again. Pulse 104. Respiration 36.

He soon fell asleep, and slept quietly for about two hours. He woke complaining of the pain about the epigastrium.

September 16th, 1 a.m.—Pulse 104. Respiration 40. An enema of egg, brandy, and arrowroot, with a little laudanum, was administered. After this he again went to sleep, and slept until about 6 a.m. When he woke he complained of no pain, but he objected to the administration of another enema. At 6.30 he complained of pains all over him, but not of any particular pain about the abdomen.

At 7.15 a.m. a sudden change took place. His eyes became fixed; his countenance more pallid than ever; his pulse very feeble and flickering. He appeared to be dying of sheer ex-

haustion. He quietly sank, and at 8 o'clock (about sixteen hours after the completion of the operation) he died.

Post-mortem examination.—The obstruction was found, as anticipated, to be due to epithelioma of the Œsophagus and accompanying constriction of the tube. The growth was situated just above the level of the bifurcation of the trachea. Ulceration had extended through into the trachea, into which there was a slit-like opening nearly an inch in length communicating with the Œsophagus.

The viscera generally were healthy. No evidences of disease worthy of note were discovered in any parts of the body other than those mentioned.

There was no trace of peritonitis. No fluid had escaped into the abdominal cavity.

The attachment of the stomach to the parietes was perfect.

The opening into the stomach was near the cardiac end, and somewhat nearer the greater than the lesser curvature.

The stomach was very small, contracted, and empty.

REMARKS.—So far as I have been able to ascertain, this is the eighth case in which gastrotomy has been performed on account of obstruction of the Œsophagus. M. Sédillot, of Strasbourg, has operated in two cases;¹ my colleague, Mr. Cooper Forster, in two cases;² Mr. Sydney Jones, of St. Thomas's Hospital, in two cases;³ Dr. Fenger, of Copenhagen, in one case;⁴ and myself in one, the present case.

It is doubtful whether life has been at all prolonged by the operation in any one of these cases. Mr. Sydney Jones's second patient survived longer than any other, but died on the twelfth day after the operation. In some of the cases, it is possible, nay, probable, that the patients might have lingered on somewhat longer if they had not been operated upon. But in spite of the want of success that has hitherto attended the efforts made, I cannot but think that the operation of gastrotomy needs no defence. One fault there has been. In every case,

¹ 'Traité de Médecine Opératoire,' tom. ii, p. 272. 'Gazette des Hôpitaux,' 1853.

² 'Guy's Hospital Reports,' third series, vols. iv and v.

³ 'Transactions of the Pathological Society,' vol. xi, p. 101. 'Lancet,' December 16th, 1866.

⁴ 'Archiv f. path. Anat. und Physiol.,' 1854, b. vi, p. 350.

so far as I can judge, and notably in my case, the operation has been performed too late. In no case has there been a fair chance of success. The chance of success must of necessity be small indeed, when any patient, in the last stage of exhaustion, is subjected to an operation so severe as that under consideration. As a rule, when about to perform any serious operation, we rightly endeavour to get the patient into as good condition as we can. But this operation hitherto has always been put off until the last moment, when the patient is literally dying of starvation. At such a moment, and under such circumstances, the conditions are as unfavorable as possible. The flickering flame of life wants but a puff to put it out. All power of recuperation is gone. It is even at best but doubtful whether power is left to render of good avail the nourishment then supplied.

In spite of these, and other considerations having a like tendency, I have no shadow of regret that I operated in the case above detailed. The reasons which induced Dr. Wilks to suggest, and myself to perform the operation, were similar to those which actuated Dr. Habershon and Mr. Cooper Forster in the case already alluded to. These reasons are clearly and forcibly stated in the volume of the 'Guy's Hospital Reports' for 1858. Their cogency is in no degree diminished by the result of the attempts hitherto made. In some respects, indeed, the experience acquired does but serve to encourage us to fresh attempts. We have learnt that the stomach can be reached, opened, and attached to the abdominal walls without difficulty; and that the operation itself is not attended by any immediate danger.

Amputations have been said to be the opprobria of surgery. Such an assertion is obviously and emphatically unjust. Surely, however, it might be said, and with some show of justice, that it is indeed an opprobrium of surgery that hopeless starvation should be accepted as the inevitable issue of simple obstruction of the gullet. And yet no method of avoiding this horrible issue has been proposed so feasible as that afforded by the attempt to establish an artificial way into the stomach.

It is manifest that the cases in which gastrotomy is most likely to be the means of prolonging life are those in which the oesophagus is obstructed by the contraction of cicatrices rather than by the presence of new growths. But even in the case

of new, and more or less malignant cell-growths, it is by no means certain that the vital organs must be invaded. In the instance especially under consideration there was no disease whatever in any of the viscera. And indeed Rokitansky affirms that "Cancer of the œsophagus generally occurs in an isolated form, *i. e.*, without the coexistence of disease in other organs."¹ Now I do not think that our experience altogether supports this affirmation. But, beyond dispute, cases do occur from time to time in which death takes place from simple starvation before the disease has reached the stage of secondary development. In any such instance the case may be practically regarded for the time being as one of simple obstruction of the œsophagus. Epithelioma is, I believe, the commonest form of malignant disease of the œsophagus. And we know that general infection from local epithelioma takes place comparatively slowly. Further, I think we are justified in stating that irritation of an epithelioma not only favours its local growth, but tends to induce its development elsewhere, especially in the lymphatic glands. In an epithelioma of the œsophagus the constant irritation produced by attempts to swallow, and much more by attempts to pass a bougie, must obviously have such tendency. And, on the other hand, the assurance of perfect rest to the part affected must tend to delay the local growth and general spread of the disease.

In all cases of epitheliomatous or other malignant disease of the œsophagus, before performing or even proposing the operation of gastrotomy, it is, of course, very desirable to ascertain whether any of the viscera are already infected; and if infected, to what extent. But it is always difficult, and often impossible to do this.

Some three years ago I had under my care in Job Ward a patient suffering from obstruction of the œsophagus. He reached the stage of absolute inability to swallow. After due consultation with my colleagues (Dr. Gull especially advised with me in the case) I proposed gastrotomy as offering the only chance of relief. The patient readily assented. He was told that he never would be able to swallow again. It seemed to him from his experience, as it did to us, that this was true. The

¹ 'Pathological Anatomy,' vol. ii, p. 12.

smallest bougie could not be passed without the exercise of dangerous force. Starvation impended. The man was comparatively young. He clung to life. He craved for food. All was arranged for the operation. The case appeared to be a most favorable one. No evidence of visceral infection could be discovered on the most careful examination. On the morning fixed for the operation, and fully prepared for what I believed I was about to do, I went to the bedside of the patient. He at once said, "It is all right, I can swallow quite well now. I woke up in the middle of the night and felt I could swallow; I drank some milk standing by my bedside without difficulty, and I have had plenty of nourishment since."

For about ten days the patient continued to swallow fluids with comparative ease. At first he managed to get down some small portions of solid food. On the tenth day he died suddenly. No post-mortem examination was allowed, although every attempt was made to induce the friends to consent. The case is, therefore, incomplete.

I venture, however, to express my opinion—first, that the recovery of the ability to swallow was due to some portion of the obstructing growth having sloughed away; and secondly, that secondary infection had taken place, and death was caused by the pressure or otherwise acting influence of diseased glands upon the solar plexus or semilunar ganglia. Sudden death in the case of secondary cancerous disease of the abdominal lymphatic glands is by no means uncommon. Several instances have come under my observation.

It may be considered fortunate that the patient whose case I have thus briefly sketched recovered his ability to swallow in time to prevent the performance of the operation. If the operation had been performed, however perfectly it might have fulfilled its purpose, the fatal issue would not have been averted. But the list of unsuccessful cases of gastrotomy would have been increased; and thus the operation might have been to the minds of some still further discredited. This case however, like others, manifestly could not have been considered to have afforded any fair test of the general practical merits of the operation.

With regard to the operation itself, it appears to me that the method practised by Mr. Cooper Forster, Mr. Sydney Jones,

and myself, possesses all the recommendations claimed for it by Mr. Cooper Forster, who was the first, I believe, to adopt it.

The method of M. Sédillot involves making a crucial incision through the abdominal walls, cutting through the rectus muscle and seeking the border of the liver as a guide to the stomach. In such case there is every probability of reaching the pyloric rather than the cardiac end of the stomach. Although open to several obvious objections, this method is quoted by Mr. Erichsen in preference to the English method.¹ It is difficult to understand why this should be. No explanation whatever of any supposed superiority is indicated. I venture with all respect to allude to this matter, because Mr. Erichsen's work is one to which constant reference is most deservedly made. Consequently it is by no means impossible that some surgeon about to perform gastrotomy, and seeking guidance from authority, might be induced by the preference suggested, to adopt what certainly appears to me to be decidedly the worse method.

In conclusion, I would only add that I believe there is ample room for hope that further experience and better opportunity may yet enable us to class gastrotomy among the successful operations of modern surgery.

Obviously enough it cannot be the means of permanently removing or curing the disease which may have called for its performance. But it may help us to lessen suffering, and to lengthen life. Theoretically the operation seems so right, and the cases in which alone it can be suggested are so hopeless, that it seems to me to have just claim to fairer and fuller trial than it has yet met with.

In order that it may have such fuller and fairer trial, the experience of a greater number of cases is necessary, and the operation must be performed considerably earlier.

It appears to me that the operation should be performed early enough to enable adhesion to take place along the edges of the wound, before it becomes absolutely necessary to introduce food at once and so to excite the movements of the stomach.

Further, when the time for the introduction of food has arrived, very small quantities only should at first be introduced at a time. Such quantities should be gently passed through the opening from a spoon or some such instrument, and not

¹ 'Science and Art of Surgery,' 1864, p. 891.

rapidly poured by means of a funnel through a pipe pushed into the stomach.

When a patient is on the brink of death from starvation, the inclination to put a quantity of food into the stomach by the easiest method is natural and almost irresistible. Such introduction of food however, most probably does harm. If the vital powers of the patient are so far exhausted that there is no time to wait until the process of gradual feeding can become of good avail, it is scarcely likely that the operation can be successful.

ON SPLENIC TUMOURS.

By C. HILTON FAGGE, M.D.

IN the following communication my main object is to draw attention to certain characters which belong to large tumours of the spleen, and which, I think, have not yet received their due share of notice from writers on diseases of that organ.

CASE 1.—In the year 1867 I had under my care in the Infirmary for Children a male infant, aged one year and eight months, affected with enlargement of the spleen and leucocythæmia. The mother stated that the child, J. E—, had been ill since his birth, that he was one of twins, and that he was affected exactly in the same way as his brother had been, who had died three months before, having wasted away with enlargement of the belly and spots on the skin.

When I first saw J. E— he was very pale and wasted; there were abundant purpuric spots on the skin; the abdomen was much enlarged, containing a tumour which was recognised to be the spleen, but which occupied to what seemed an unusual extent “the iliac and pubic regions, and was curved on itself, so that the lower part of its notched anterior or inner edge looked upwards.”

The child died a month later.

On post-mortem examination I found that the tumour in the abdomen was indeed the spleen, and that its form was precisely that which had been noted during life. The liver also was considerably enlarged, being plainly felt before the abdomen was

opened. The blood from the hepatic vein contained a very marked increase of white corpuscles.

There were in this case several noteworthy points :

The assertion of the mother that the twin brother of the child had died of an exactly similar disease was indeed unsupported by medical testimony, but it appeared to me at the time to be more trustworthy than such statements generally are. The occurrence at so early a period of life of a chronic organic disease, like splenic leucocythæmia, seemed very remarkable, and I searched the standard work of MM. Barthéz et Rilliet in vain for a description of the disease. I have since found, however, that Dr. West in his book on the 'Diseases of Infancy and Childhood' gives a most excellent account of cases of this kind which had been under his observation. He says he has known considerable enlargement of the spleen, associated with leucæmia, in a child, only three months old. In the majority of cases, however, the age of the patient varied from nine to fifteen months; but the size of the organ showed that the disease must have begun long before that time. Dr. West particularly insists on the "peculiar waxen hue" which is presented by infants suffering from this affection, and which was very striking in my case. He also notices that severe and even fatal hæmorrhages sometimes occur. It is well known that in adults epistaxis is among the most common complications met with in cases of splenic leucocythæmia.

I may observe in passing that Dr. Bright, although of course ignorant of the altered character of the blood in this disease, appears to have been familiar with its occurrence in infancy. "In young children," he says,¹ "this form of disease (*fleshy hardness of the spleen, with enlargement*) is still more frequent than in adults, and in them it is more fatal. It often begins to show itself at two or three months of age, gradually increasing till it bears a very large proportion to the whole contents of the abdomen; and it is to be traced quite into the pelvis, and extending far beyond the linea alba, towards the right side. In these cases it is often attended with the appearance of petechiæ all over their cadaverous and pale bodies. Such children seldom live above a year, or two or three; and fall victims to emaciation, and often to mesenteric disease."

¹ 'Guy's Hospital Reports,' series i, vol. iii, 1838, p. 403.

We may perhaps pardonably feel some pride when we read these statements of Dr. West and of the late Dr. Bright, and think of the total omission of any reference to the subject in the work of MM. Barthez et Rilliet, and of the chapter on leucocythæmia in M. Bouchut's '*Manuel des maladies des Nouveaux-Nés et des Enfants à la mamelle*,' in which last book the statements of Virchow and Bennett are repeated in detail, but without (so far as I could see) a single sentence as to its occurrence in infants or children. Two German writers, Löschner¹ and Golitzinsky,² have written on the "leukhœmia" of early life. The four cases published by Löschner were in children from three to twelve years old. Golitzinsky speaks of it as occurring "chiefly in children at least a year old."

The point, however, which especially attracted my attention in my case was the remarkable form assumed by the enlarged spleen. It was curved on itself, so that its anterior notched edge at the lower part looked upwards, and its inferior extremity projected across the abdomen to the right below the umbilicus. I determined to observe whether the same form should present itself in other cases of splenic tumour that might hereafter come before me. Since that time I have met with several instances of a similar kind in patients under my own care or under that of my colleagues at the hospital; and I have made from them the diagrams which follow:

CASE 2.—*Enlargement of the spleen from intermittent fever.*



FIG. 1.

¹ '*Jahrbuch für Kinderkrankheiten*,' 1859.

² *Ibid.*, 1861.

Henry S—, æt. 25, attended among my out-patients for some time, and was admitted into Stephen Ward under Dr. Habershon's¹ care July 1st, 1868, suffering from quartan ague. He lived at Woolwich. The spleen occupied the position shown in the diagram. The shaded part on the right side represents the extent of the hepatic dulness. There was no increase in the number of white corpuscles in the blood. He was treated with large doses of quinine, and the spleen rapidly decreased in size. He was discharged on July 29th.

CASE 3.—Enlargement of the spleen; leucocythæmia.



FIG. 2.

This diagram represents the form of the enlarged spleen in the case of H. F—, æt. 40, who was sent into Mary Ward under Dr. Oldham's care in 1867, and from whom the organ was removed during life by Mr. Bryant. The details of the case have been recorded in the last volume of these 'Reports.'

CASE 4.—Enlargement of the spleen; leucocythæmia.

(Reported by Mr. B. EDWARDS.)

William K—, æt. 36, was admitted into the clinical ward under my care, August 4, 1868. Two months before he had been obliged to leave his work on account of debility and sensations of pain and fulness in the abdomen. For the last eighteen months he had noticed a swelling and hardness of the

¹ I have to thank Dr. Habershon for his readily-accorded permission to refer to this and two other cases of his, which I saw only as Medical Registrar to the Hospital.

belly. On admission he was anæmic, careworn and slightly emaciated. The outline of the spleen could be plainly felt, as

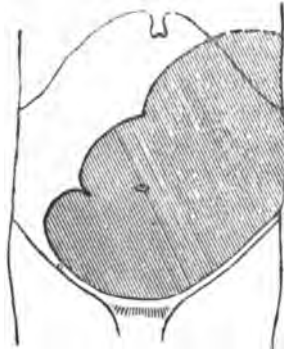


FIG. 3.

shown in the figure, and the two notches in it could be easily recognised on palpation. The hepatic dulness was greatly increased, but this has been omitted from the diagram. The urine was albuminous, of sp. gr. 1015. He went out on September 14th unrelieved.

CASE 5.—Enlargement of the spleen; leucocythæmia.



FIG. 4.

T. H—, æt. 15, was admitted into Stephen Ward under Dr. Habershon's care, June 7, 1867. The notes of his case were taken by Mr. L. Carré. He had been ill for nearly two years. The complaint began with pain on the left side directly under

the ribs. The abdomen then began to enlarge. He had been in St. Thomas' Hospital, and tincture of iodine had been painted over the abdomen. This had for the time considerably reduced the size of the swelling ; but it afterwards again increased. Epistaxis had not occurred ; but the boy said that during the previous autumn he had on three separate occasions had teeth out, and that each time hæmorrhage had continued for two or three days. His urine was albuminous, but of sp. gr. 1024.

The diagram (fig. 4) which I made from examination of this case does no justice to the amount of enlargement, although indicating sufficiently its seat and its relations to different parts of the abdominal parietes. It did not appear to dip into the pelvis, but to curve round in the manner displayed. The notches, in particular, could be plainly felt. There was a considerable amount of ascites. The boy went out on October 2nd, 1867. I afterwards heard that he had died. I believe that no post-mortem examination was made.

CASE 6.—Enlargement of the spleen ; leucocythæmia.

M. A. P—, æt. 34, was sent up into Mary Ward under the care of Dr. Hicks, May 25th, 1868, as suffering from ovarian disease. On her admission she had peritonitis, and the abdomen was greatly distended and so tender that she could not bear the slightest examination ; after about a fortnight the excessive tenderness subsided, and Dr. Hicks then discovered that there was a large solid mass, with a sharp edge, occupying the lower part and left side of the abdomen. Dr. Hicks observed fluctuation, such as would be considered, in the case of an ovarian tumour, evidence sufficient of a cyst with thick walls ; this was noticed especially in that lobe of the tumour which projected towards the right side. A vaginal examination showed that the uterus was pushed a little to the right side, but that the tumour, instead of springing from the pelvis, rested on its brim. He, therefore, concluded that the tumour was probably spleen, and asked Dr. Wilks to look at the case. On taking a little blood from the finger, it was found that there was an enormous increase of white corpuscles. I made a rough diagram of the form and seat of the tumour, from which the figure below

has been copied. I may note, however, that the abdomen hung down over the thighs in a way that could not be represented in the figure.

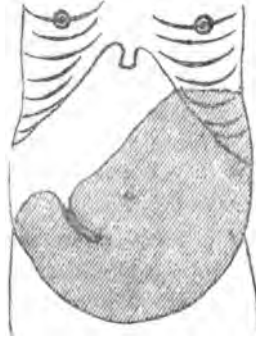


FIG. 5.

She had a second severe attack of peritonitis, but this subsided, and she left the hospital to return to her home at Lewisham. She ultimately died there, and Mr. S. S. Brown made a post-mortem examination in the presence of Dr. Braxton Hicks and myself.

The body was emaciated to the last degree, and the tumour shared in the general wasting. It was, therefore, considerably smaller than it had been when she was in the hospital, but its form was retained and was exactly that shown in the diagram.

The uterus was found to have its fundus directed to the right side, as had been observed during life.

The chief point of *pathological* interest was that the kidneys presented several white masses of some size. My friend Dr. Moxon very kindly examined one of these for me, and wrote to me that there was "kidney tissue in it, some malpighian corpuscles coming out very well. Generally the substance was confused from the presence of a corpuscular material with fibrils between, reminding one of lymphatic glandular tissue, the fibrils being connected with the corpuscles at points. It, however, had much the same appearance as some parts of clot." It is, I believe, common in cases of leucocythæmia to find the enlarged spleen containing several yellow masses, appearing on the surface as patches, and extending into the substance of the organ for a considerable distance. The spleen removed by Mr.

Bryant in 1867 presented them; and they likewise existed in the case now under consideration. I do not remember, however, to have seen the same appearance in the kidney except in this case. The point is one of some interest, as bearing upon the question whether the disease in leucocythæmia is a general one, merely having its most marked local expression in the spleen, or whether, as Dr. Wilks used to hold, it is originally a local affection. It is generally recognised that the liver presents morbid changes; but these might be supposed to be secondary.

The diagrams which I have given seem to show that the spleen, when enlarged, undergoes a change in form which would hardly have been anticipated. The cases above referred to are not the only ones in which I have observed similar characters, and I have every reason to believe that these are constant.

So far as I am aware, no diagrams or figures at all similar to those given above are to be found in any book or essay on abdominal tumours; and medical literature seems to contain but very few and scanty references even to the fact that tumours of the spleen ever extend across into the right side of the abdomen. I have already quoted a passage from Dr. Bright's papers which shows that he was aware of this fact; and Dr. Aitken, in his standard work, speaks of the spleen as "sometimes extending low down into the pelvic region, well over on the right side of the *linea alba*." I am inclined to infer that the writers referred to supposed the hypertrophied spleen to descend in the first instance into the pelvis, and to pass over to the right side only when it had increased still further in size. This, however, is certainly not the case; in fig. 1 *supra*, Case 2, we see an enlarged spleen beginning to curve round at its lower end, when it is still well above the crista ilii; I observed the same thing in Case 1; and one of Dr. Bright's diagrams (Plate II, fig. 1) shows the same thing at its earliest commencement. The change of form seems to be caused by the traction of the peritoneal folds which pass from the stomach and pancreas to the hilus of the spleen. It certainly is not the result of any resistance experienced by the organ in passing directly downwards. Most writers speak of the spleen as descending into the pelvis, when sufficiently increased in size. For my own part

I am inclined to doubt whether this ever occurs, unless we understand by the term pelvis the "false pelvis" formed by the iliac fossæ.

The chief clinical interest in the fact to which I believe I am the first to direct attention is in reference to the possibility of mistaking an enlarged spleen for an ovarian tumour. It has, I believe, happened that the operation of ovariectomy has actually been thought of, or even undertaken, in cases of this kind; and the reader may perhaps have noticed that each of the two women whose cases are referred to in this paper was in the first instance sent in under the care of the obstetric physicians. In both instances the real nature of the case was at once discovered; and I do not think that a mistake is likely to be made by any one who is aware of the tendency possessed by an enlarged spleen to become curved and to fill the hypogastric and right iliac, as well as the left iliac, regions. The sharp outline presented by the tumour, and the notch or notches in it, ought at once to suggest that it is the spleen. If any doubt should remain, it may be at once dispelled by a microscopic examination of the blood; for the evidence which has been accumulating during the years that have elapsed since the discovery of leucocythæmia is probably now sufficient to justify us in maintaining that (apart from ague) a considerable enlargement of the whole spleen, as the sole or principal disease, never occurs without an increase of the white corpuscles of the blood.

In speaking of the spleen as having, when it has reached a certain size, a *constant* tendency to curve into the hypogastric and right iliac regions, I, of course, refer only to an affection in which the whole organ is concerned, and not to cases in which an abscess or an hydatid cyst may occupy merely a part of it. I therefore append the following diagrams by way of contrast to those above.

CASE 7.—*Hydatid tumour of the spleen.*

(Reported by Mr. CARRÉ.)

H. J. S—, æt. 38, was admitted into Philip Ward under Dr. Habershon's care June 18th, 1867, for an abdominal tumour,

which had as nearly as possible the outline and general form showing in the annexed diagram. He stated that he had had



FIG. 6.

a pain in the left side for eight years, and for four years had noticed a tumour which had gradually increased in size. It was very tender. It pushed outwards the ribs, and reached well into the left loin, and a wave of fluid could be transmitted into the loin from in front.

Mr. Bryant tapped the tumour, and drew off thirty-seven ounces of clear liquid. This was non-albuminous, and I found in the sediment from it an echinococcus head, provided with circles of hooklets. It was, therefore, clear that the disease was hydatid, but its seat remained uncertain. The tumour had interfered with the stomach, for the patient had stated that he had pain after taking food;—in his own words, “the food seemed to go down behind the tumour, and cause pain.” On the morning after the operation he said that this pain had entirely left him.

The tumour diminished greatly in size after being tapped, and on July 20th it had the form represented in the following diagram (fig. 7).

He left the hospital on October 1st, very much relieved.

On December 18th, 1867, he was re-admitted, the tumour having regained nearly its original size. Mr. Bryant again tapped it, and drew off five pints of turbid fluid of a yellowish

colour, looking as if it contained bile, and “giving faint green and less violet colours with nitric acid,” according to the

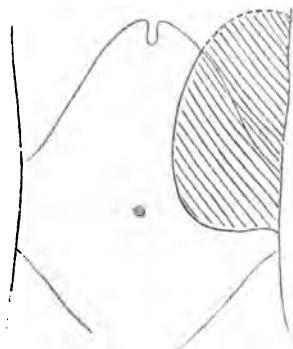


FIG. 7.

statement of the clinical clerk, Mr. F. Taylor, who carefully reported the case. It also contained a large quantity of albumen and floating crystals of cholesterine.

The diagnosis as to the seat of the tumour now became more than ever uncertain. The patient gradually sank, and died on April 26th.

The post-mortem examination was made by Dr. Moxon. It was found that the cyst had originally been situated entirely within the capsule of the spleen, having splenic tissue for a thickness varying from half an inch to one inch and a half all round it, except at three points where openings existed, leading—one into a large abscess in the cavity of the lesser omentum, another towards the transverse colon, and the third towards the diaphragm. The track formed by the canula was distinct from all these. The diaphragm was pushed upwards, and the greater part of the left lobe of the liver had been so compressed that its cellular structure had disappeared. The stomach was pushed forwards and to the right, and the splenic flexure of the colon lay much nearer the umbilicus than natural. The cyst was lined by a well-formed pyogenic membrane, and contained several shreds of hydatid.

A CASE
OF
OVARIOTOMY IN A CHILD;
WITH REMARKS.

BY THOMAS BRYANT.

*A case of ovarian disease in a child æt. 14 ; ovariectomy ;
recovery.*

(Reported by Mr. FREDERICK S. DALDY.)

H. W—, æt. 14, was admitted into Guy's Hospital on June 24th, 1868, under the care of Dr. Oldham and Mr. Bryant. She was a remarkably healthy intelligent-looking child ; she had been acting as a servant. Her general health had always been good. She had never menstruated, nor were any of the physical signs of puberty present.

For six months before her admission she had suffered from pains in the right side of her abdomen, and for about a month in the left. Soon after the pains appeared the patient noticed a swelling in the left side ; since then the swelling had gradually increased. Her general health all this time had been good.

On admission her abdomen was very large ; a fluctuating elastic tumour was found to occupy the left side of the belly ; it extended across the abdomen, and ascended for about two inches above the umbilicus. Through the greater part of the tumour there was distinct fluctuation to be detected, but the growth being clearly composed of many cysts, this was not equally distinct throughout. The surface of the cyst was unequal from

its polycystic nature ; on the right side of the tumour, near the umbilicus, a distinct friction fremitus was to be detected with the hand ; this fremitus was present over the whole right side of the growth. The intestines were pushed up well into either loin.

Dr. Oldham made a careful pelvic examination. He found the uterus to be small and infantile, and the cyst well out of reach ; it was clearly out of the pelvis.

The operation of ovariectomy was determined upon.

On July 24th, with the patient under the influence of chloroform, Mr. Bryant removed the tumour. He made an incision about six inches long below the umbilicus, and tapped the cyst, drawing off about eight pints of a thin serous fluid. The tumour was then drawn out, some omental adhesions alone complicating the case. These were tied and the ligatures fixed at the upper part of the wound. The pedicle was a long one and not broad ; it was tied in two portions with a thin whipcord. The ends of the ligature were cut off and returned with the pedicle into the pelvis. The intestines were not touched, nor was the pelvis sponged out, for no blood nor any contents of the cyst had escaped into the abdominal cavity. The uterus and right ovary were found to be healthy. The wound was stitched up with the small round fishing silk such as Mr. Bryant always uses, and a morphia suppository given. The patient was then placed in bed. Some little vomiting followed the operation, but this soon ceased, and a little pain in the abdomen was experienced on the second day, but on the third both these symptoms had disappeared. Her pulse was 98, and of good power ; tongue clean ; skin cool ; abdomen flaccid. She took her iced milk and beef-tea with appetite.

On July 29th, or fifth day, the sutures were removed, the wound having healed ; she had some chicken and wine for dinner.

On July 31st, or seventh day, the child, although apparently going on well, passed blood in her urine ; this hæmaturia lasted for twenty-four hours, and fifteen ounces of bloody urine were passed, the quantity of blood diminishing at each micturition. There was no pain or other symptom of constitutional disturbance.

On August 2nd an enema was given, and the bowels were freely opened.

On the 17th the child was up.

On September 10th the patient left the hospital well, wearing an abdominal belt.

Examination of the tumour.—The tumour weighed about four pounds, it was compound, many of the cysts being large. One or two of them had been tapped at the time of operation, and of the remaining cysts four or five contained from half a pint to a pint of fluid each. The character of the fluid in the different cysts was most varied. In some it was of the so-called linseed-tea appearance; in others it was much darker, while in some it was clear and so thin as to resemble the fluid from an hydatid. The walls of the parent cyst were thick and coriaceous; they were highly vascular, their inner surface being minutely injected.

Remarks.—This case is worthy of record for several reasons. The fact that it occurred in a child with no physical signs of puberty about her is a point of special interest, for the disease clearly began and ran its course in an infantile organ before the ovaries had commenced their active life. It is true that ovarian cysts are occasionally found in the young, for, in the museum at Prague, there is a rare preparation of a cyst formation in the ovary of a child only one year old; and Kiwisch has related a case in which ovarian disease appeared at fourteen years of age. I have also recorded in my work on 'Ovariectomy' two examples in which girls, aged respectively fifteen and sixteen, sank after tapping from suppuration of ovarian cysts; but for a disease to have commenced and developed to such an extent as in the case just related is a point of unusual interest, and I am not aware of any other instance of a like kind having been recorded.

The character of the tumour is another point also worthy of remark; for it was more like the chronic ovarian tumour we find in the middle-aged than any of an acute kind. The thick and almost cartilaginous nature of the parent cyst-wall was very remarkable, for the tumour had apparently been only of six months' growth, yet it resembled more the thickened tunica vaginalis of an old hydrocele than any other formation with which I am acquainted. It certainly was very unlike the more rapidly growing ovarian tumours found in the middle-aged, although it approached somewhat in character the chronic

ovarian cysts of adult life. The diverse nature of the contents of the different cysts is worthy of notice, although it is too common to excite surprise; for in the tumour which was removed there were cysts which contained fluid as limpid as hydatid fluid, and others in which it was as dark-coloured and thick as is ever seen in ovarian disease.

The rapid recovery of the patient is the last point worthy of remark, for the convalescence was steady from the first, and was marked with an almost entire absence of pain. From the day of operation the pulse never varied in its number, 98, and no constitutional disturbance interfered with recovery. However, the attack of hæmaturia for twenty-four hours was a symptom worthy of note. It came and disappeared without any physical distress, and interfered in no way with the patient's welfare. Its cause was as obscure as its course was satisfactory, but upon its nature I forbear to speculate.

CASES ILLUSTRATING THE TREATMENT
OF
SUPPURATING OVARIAN CYSTS,
AND
SOME POINTS CONNECTED WITH OVARIOTOMY.

By THOMAS BRYANT.

CASE 1.—*Ovarian disease; suppuration of the cyst; free incision into the sac; convalescence.*

Esther B—, æt. 34, a married woman, the mother of eight children—three having been born during the last four years—was admitted into Guy's Hospital on September 1, 1864, under the care of Dr. Oldham and Mr. Bryant, having been sent in by Dr. Hullett Browne, of Gordon Square. She had been the subject of ovarian disease for four years, and the tumour had increased slowly but steadily; till quite recently it had caused her very little pain, except from its size.

For some months—about five—she had, however, suffered a good deal; there was constant pain of a dull character in the tumour, and her general health had begun to fail. In December last the pain was at its climax, and was attended with vomiting. Since then the tumour had clearly diminished in size.

On admission, the abdomen was filled with a large tumour about the size of a pregnant uterus at its full time; it was clearly cystic, and apparently made up of many cavities. Any-

thing like pressure upon it caused pain, and even the gentlest manipulation distress. There was in it indistinct fluctuation.

The general appearance of the woman was very unsatisfactory. Her complexion was sallow and unhealthy; skin hot and at times bathed in perspiration; pulse 120, small, feeble, and rapid; tongue furred; appetite bad. Upon the whole, it appeared as if the tumour was undergoing some degenerative change. Consequently ovariectomy was postponed, although the woman had entered the hospital for the purpose of having it performed.

As months passed away these symptoms did not improve; but, on the contrary, they became more marked, and it was tolerably clear that the patient's powers were giving way. It was, therefore, determined to explore the tumour, and, if suppuration existed, to let out the pus. On February 18th the operation was performed by making an opening midway between the umbilicus and pubes. The incision was made carefully through each tissue, and when the cyst was reached it was punctured; some horribly foetid pus escaped. The incision was then increased upwards and downwards, making altogether a wound about four inches long, and seven or eight pints of purulent fluid with broken-up tissue were let out. The cyst was washed out and the walls carefully stitched to the margin of the abdominal wound.

The patient experienced great relief from this operation, and all her constitutional symptoms rapidly improved.

The cyst was washed out daily.

By March 29 the cyst had greatly contracted. There was very little suppuration. The cavity would hold less than half a pint of water, and the injection came away clear. The abdomen was of nearly its natural size, a very small mass of solid tumour being perceptible. The patient's general health had greatly improved. She took her food well, and daily gained strength. She had very little abdominal pain.

On April 15 the second tumour, or rather mass, that was to be detected in the abdomen, suddenly lessened, and foetid discharge again appeared from the wound; it was of the same nature as the previous discharge. The patient had been poorly for some days before, suffering from severe abdominal pain and some slight constitutional disturbance. The discharge came

in large quantities, and contained broken-up tissue. Indeed, it was tolerably clear that another portion of the tumour had softened down and suppurated, the abscess having burst into the parent cyst. In another ten days the constitutional disturbance caused by this fresh action had subsided, and on April 26 the patient was up and about the ward. The cyst during this time was daily washed out with a syringe, and good diet was given. From this time everything went on most favorably. What remained of the abdominal tumour was not larger than a fist; the opening into the cyst had so contracted as to be represented by a sinus, into which a small catheter could be passed. Very little discharge came from the cyst; what passed was watery and inoffensive. The general power of the patient also improved.

By August she was well enough to leave the hospital, wearing a belt; she had directions to wash out the cyst herself with a syringe, and to pass a catheter into the wound daily to prevent its closing.

On February 15, 1866, I saw this patient. Her general health was really good; she was able to do her ordinary domestic work without unusual fatigue, and experienced very little pain or inconvenience from her old complaint. The sinus was still open, and discharged at times, the wound having been kept open by the occasional passage of a small catheter. The cyst, or rather what remained of it, was represented by a mass about the size of a fist. There was no pain in the abdomen, or other symptom of disease.

This patient again presented herself in June, 1867, and was very much in the same condition as at the last report.

Remarks.—The case which has just been recorded demands attention, because it is a type of a class of cases which at times come under notice and which are too frequently left to themselves, from the feeling that any such operative measure as ovariectomy is out of the question, and with the hope that nature's own processes will find a way of giving relief. This way is, however, generally by the death of the patient. Occasionally the suppurating cyst may open into some cavity, such as the bladder or bowels, or into the vagina; occasionally it may open and discharge externally; but too frequently the

patient dies unrelieved, exhausted, recent peritonitis hastening the end.

The history of the case just related appears to point out a way by which relief may at times be given in such cases, if not a cure gained, and suggests some points of practice of no little importance.

First of all it clearly proves the great benefit that is to be conferred on a patient by laying open a large suppurating cavity, and establishing a free outlet for its contents, even when that cavity is in the abdomen, and of an ovarian nature; but it is to be remembered that a large opening was made in the case recorded, and that the cavity was kept clean by daily washing.

It can hardly be doubted that a small incision into or tapping of the cyst would not have been followed by a like successful result; for general surgical experience is certainly not favorable to such a line of practice, although it cannot be asserted that, at the present time, it is more so to the long incision, and free evacuation of the tumour's contents. For my own part, I believe that any large suppurating cavity, when it is to be opened at all, should be opened freely; and that so long as the cavity can be kept empty and well cleansed, a healthy reparative process will be carried on by nature's powers, and that a good chance of recovery will consequently be given. The washing out of large abscesses, the treatment of empyema by means of the drainage tube, and other like cases, all tend to support this view; and the case I have just given certainly adds a weighty argument to support the practice.

But is it always an easy matter to make out that an ovarian tumour is undergoing degenerative changes? And, unless such a diagnosis can be made, would a surgeon be justified in tampering with the cyst, or in tapping and exploring it? The answer I am disposed to give to such a question is somewhat favorable to the exploratory measure; for even assuming that it may be difficult to make out with certainty that a tumour is degenerating, there can be little doubt that a shrewd suspicion of such a change can generally be formed, and that, under such doubtful circumstances, an exploratory incision down to and into the growth is quite justifiable.

A carefully made incision of a limited nature—about an inch is amply sufficient—may surely be employed without great danger

under such desperate circumstances; for the chances of giving relief to a sinking patient are so great under these conditions that the extra risk, when uncertainty exists, seems to me fairly justifiable. Such an exploratory measure need not be much more than a tapping.

Another case in point may here be related which bears forcibly upon this subject. It made a great impression upon my mind in many ways when it occurred. It has been related in detail by Dr. James Williamson, of Mildmay Park, Islington, in the 'Lancet' of March 10, 1866. The points, as far as they bear on the present subject, are as follows:

CASE 2.—Suppuration of an ovarian tumour; attempted ovariotomy; subsequent sloughing of the cyst, and recovery.

Mrs. C—, æt. 35, the mother of three children, consulted me in April, 1864, on the recommendation of Dr. Williamson, for an ovarian tumour. The disease had existed for nearly three years and had been progressive. During this period pregnancy took place, but at the sixth month, or thereabouts, sickness set in so severely, and the swelling increased so much, that Dr. R. Lee, who was consulted, brought on premature labour on March 10th, 1864. On April 6th, the tension of the tumour being still great, tapping was performed by Dr. Williamson, and fourteen pints of a clear fluid were drawn off. The tumour was then made out to be multilocular. When the patient had recovered from this operation—Dr. Lee refusing to entertain the idea of ovariotomy—I was consulted. I saw this lady on several occasions. When I first visited her her abdomen was very large, and clearly contained a polycystic ovarian tumour. Her general condition, however, was not good. The question of ovariotomy was discussed, but postponed till the general health of the patient should have somewhat improved. Dr. Oldham was also consulted at this time and gave the same advice. This lady then went down to Brighton for one month and returned much improved, consequently the day for the operation was arranged—June 18th. However a day or two before this Mrs. C— complained of "something giving way in her stomach." This was followed by considerable abdominal pain, fever, sick-

ness, and general constitutional disturbance. The idea of operating was, therefore, at that time abandoned.

On June 30th I tapped the patient and drew off a few pints of a sero-purulent gelatinous fluid. The operation, however, afforded but little relief. For some weeks after this Mrs. C— continued to fluctuate, the pulse varying from 100 to 120, with occasional sickness as well as abdominal tenderness. Under these circumstances I regarded the extirpation of the growth as an impossibility; I believed that the peritonitis, which had clearly existed, had in all probability fixed the tumour firmly in its position, and that the general powers of the patient were too feeble to allow of such an attempt being made. In this view I was supported by Dr. Oldham, who saw the case alone with Dr. Williamson. The patient and her friends were, however, very anxious that the operation should be performed, and as I refused to do it at that time, a physician who performs ovariectomy was consulted. He examined her on July 23rd, and on the 25th tapped the cyst, drawing off five pints of a sero-purulent fluid, giving it as his opinion that it was a case holding out considerable prospect of success from operation. The cyst gradually filled again, but there was little improvement in the patient's strength, less than had been hoped for after the removal of the cyst's contents. The pulse now ranged from 80 to 100; there was, however, no sickness nor much tenderness of the abdomen.

Under these circumstances ovariectomy was performed or rather attempted, for the operator, on making his incision, found the cyst so completely adherent to the abdominal parietes that it was impossible to get behind it at any one point. The fluid portion was, therefore, drawn off, the septa broken down, and the wound closed. The rapid sinking of the patient was looked for. Happily, however, a different result ensued; considerable portions of the cyst subsequently sloughed out and were removed by the forceps from the wound, and a steady improvement followed. At the end of a month the wound had nearly healed, and she was conveyed to Hastings; for a few days she gained strength and flesh, but at the end of a week she became completely anasarctous. After three weeks she returned home in that condition. At this time Dr. Williamson reported that the wound was open at its lower part, and that through it purulent

matter exuded. After some weeks of pain and constitutional disturbance the wound closed, but only for a time, for in January, 1865, the abdomen rapidly enlarged, and became painful and tender; the pulse rose to 130; the wound again opened at its upper part, and about five pints of a sero-purulent fluid discharged itself from the abdominal cavity. The discharge continued for some days with great relief. A second opening was formed at the lower part of the wound, and a profuse discharge took place from it. "Through both these apertures," writes Dr. Williamson, "each of which was about the size of half-a-crown, folds of intestine could be seen covered with adhesions, and a considerable quantity of matter was pressed up from amongst the intestines several times a day." This sloughing process continued for about three months. During this period the patient's stomach was so irritable that, for weeks together, her chief supports were enemata of beef-tea, &c.; she was unable to retain anything on the stomach but milk and lime-water in small quantities, and occasionally a little brandy-and-water. After this time, however, her recovery was steady and uninterrupted; by August 2nd, 1865, nearly one year after the operation, the wound had healed, and her general health was really good.

In August, 1868, this lady was still well.

The ultimate result of this case was doubtless due to the close attention and skill of Dr. Williamson, who attended her throughout.

Remarks.—A case such as the one I have just related contains many important lessons; the one I would more immediately select for my present purpose is well illustrated by the success of the case, and has reference to the benefit of a free incision into an inflamed and degenerating ovarian tumour.

I will pass over, with slight criticism, the attempt that was made to practise ovariectomy; I am at a loss to understand how any professional man could have brought himself to undertake such a proceeding, for it must have been clear to a surgeon that the removal of the growth was highly improbable, not to use a stronger word; and the general condition of the patient certainly forbade a strong hope being entertained that a good result could

ensue from any such operation. Still it was most fortunate that the attempt was made, for although it failed as an operation for extirpation of the growth, yet in the end it succeeded beyond all experience. It has proved that a suppurating abdominal cyst may be freely laid open with the greatest advantage, and that however low the patient may be in her general powers, there is still good ground for the expectation of a recovery when the degenerating and suppurating cyst has been emptied of its contents. Such a measure of success, I take it, was not expected by the operating physician in the case I have related; his boldness met with a better reward than could possibly have been anticipated. If such cases, however, are to be submitted to the operation of ovariectomy; if attempts to remove ovarian tumours under such conditions as existed in the patient to which allusion has been made are to be practised, any, nay, every case of ovarian disease, however hopeless, should be subjected to the same treatment; the principle of selecting cases should be abolished, and the practice of chancing a good result introduced, however scientifically slender that chance may be. I am no advocate for such a system; no words that I can use would be too strong to condemn such a practice, for it would make the practice of the profession, at least its surgical portion, unscientific and uncalculating, and render success a lottery.

In the present case, under the most unfavorable circumstances, the operation was attempted. It failed, and a bad result could only have been looked for; a marvellously good one—fortunately for the patient—was, however, eventually secured, and thus an unexpected lesson has been saved for us. It has certainly helped to convince me that much may yet be done for patients who are clearly sinking from the irritation of a suppurating and degenerating ovarian cyst, and tends strongly to support the practice illustrated in the former case of laying open the cyst, evacuating its contents, and washing out the cavity. This practice, however, has no more to do with ovariectomy than the free incision into a suppurating and disorganized joint has with amputation. The scientific objects the surgeon has in view in the two cases are widely different.

The laying open a suppurating ovarian cyst is one thing; the extirpation of the growth is another. Both operations are

sound in proper cases, but they are not to be confused, and the selection of the cases for either proceeding should be conducted upon the same safe and scientific principles which regulate all other surgical procedures.

ON SOME POINTS CONNECTED WITH THE TREATMENT OF THE
PEDUNCLE IN OVARIOTOMY.

CASE.—Ovariectomy; ligatures cut off close and returned with the peduncle into the abdominal cavity; their subsequent discharge through an artificial anus at the lower part of the abdominal wound; recovery.

(Reported by Mr. J. W. MORISON.)

Emma S—, a single woman, æt. 36, was admitted into Guy's Hospital on September 4th, 1867, having been sent up to Mr. Bryant by Dr. Whitfield of Eastbourne.

She had always enjoyed good health, although her general appearance was somewhat pale. In May, 1866, she first observed an enlargement of her abdomen, this enlargement being apparently on the right side. Since that time the increase had been steady. There was occasional pain in the belly of a sharp character, but this never lasted for any time. The catamenia had been regular till five months before her admission, when they ceased.

On admission the abdomen was much distended and was clearly filled with fluid. It was uniformly dull on percussion when the patient was recumbent, except in the loins, where it was resonant. Fluctuation was also readily detected. The abdomen measured forty-two inches in circumference. The uterus was declared to be, on examination, normal and free. The cyst-wall was thought to be somewhat thin, and some ascitic fluid was believed to be present. Pulse 112 and weak; tongue clean; bowels regular. Her legs had swelled a little during the last few weeks.

On September 21st this patient was tapped to make the diagnosis sure, for it was uncertain how much of the fluid was ascitic. Nearly four gallons of a very light-coloured fluid, slightly sticky, containing cholesterine, were drawn off, a large

solid ovarian mass remaining. No bad symptom followed this operation, but by the 3rd of October the abdomen was nearly as large as ever.

On October 4th, therefore, ovariectomy was performed; Mr. Bryant, as usual, operated in a private ward with only such visitors present as were free from all dissecting-room-, post-mortem-room-, or other septic influences. He made an incision about six inches long below the umbilicus, tapped the abdomen, and evacuated some quarts of ascitic fluid; a semisolid ovarian cyst then came into view, which was also tapped, and two quarts of a white, highly gelatinous fluid were drawn off. The tumour, which proved to be connected with the left ovary, was then drawn out, and its peduncle secured in two portions with strong whipcord ligatures. The tumour was then separated from its peduncle about half an inch above the ligatures; these were cut off close, and the whole was dropped back into the abdominal cavity. The wound was closed with smooth silk sutures, an opium suppository was given, and the patient was placed in bed, water dressing being applied to the wound.

A little chloroform sickness followed the operation, but disappeared on the second day, and everything went on favorably.

The patient was allowed iced milk, of which she took freely.

On October 8th, or fourth day, the wound had healed. The sutures were consequently removed, some broad pieces of strapping being put on to keep the parts well together. There had not been any pain in the abdomen since the operation, nor any distension.

On October 11th, or seventh day, the strapping became loose, some ascitic fluid having made its way through an opening in the wound; it came with a rush during the night. This somewhat alarmed the patient, but on examination a very little gaping of the wound was found, and in all other respects the patient was comfortable. The bowels had been acting naturally during this period.

October 12th.—Last night some diarrhœa set in, several loose stools having been passed; it was checked, however, by a dose of chalk mixture. The patient subsequently seemed very comfortable; she was free from all pain and abdominal tenderness. Her pulse was good, tongue clean, aspect healthy; she took her food also with tolerable appetite.

October 15th.—Diarrhœa again set in, with some little abdominal tenderness at the lower part of the wound.

On October 17th a fluctuating swelling appeared at this part, this swelling being clearly tympanitic. The diarrhœa was again checked with a dose of chalk mixture, but the fluctuating swelling opened naturally on the 18th, and liquid fæces made their escape. No signs of other mischief existed. The nurse was directed to examine the fæces which passed from the artificial anus with great care, to see if any ligatures came away.

In four days, or by October 22nd, this aperture closed. Everything appeared to be going on well for one week, when diarrhœa again set in and the artificial anus again opened; fæces passed through the wound freely, and on October 29th the double loop of ligature by which the peduncle had been secured came away. In another three days the wound had again healed, and in three weeks the patient left the hospital perfectly well.



The looped ligatures as they came away, illustrating the value of crossing the ligatures before tying the two halves of the peduncle.

Remarks.—The main point of interest in the case just recorded is the discharge of the ligatures by which the peduncle had been secured through the artificial anus at the lower part of the wound; such a result is in my experience quite unique. Indeed, amongst twenty-four cases in which I have adopted the practice of dropping into the abdominal cavity the loops of the divided ligatures with the peduncle, this is the only one in which any untoward result has to be recorded which was clearly due to the practice itself. But in this instance there is hardly room for doubt that the ligatures by their irritation caused the diarrhœa, and that it was through an ulcerative process that they formed a communication with the intestine, and were discharged externally.

Such a case as the above clearly tells against the practice adopted, and although by itself it may not be sufficient to prove

the practice unsafe or inexpedient, it is enough to lead us to think that where a ligature can be left outside the abdomen without inconvenience, such a method had better be followed, and that although in certain cases the plan of dropping into the peritoneal cavity the end of the divided peduncle with the ligatures cut off close may be a good one, it is not free from its own special risks, and that we are still to look for some simpler or better plan by which the peduncle may be treated.

What that plan may be it is at present impossible to decide, but any method that leaves a foreign body within the abdomen is far from perfect. In one case which has been under my care within the last year, some half dozen ligatures had to be employed and were left in, and although for a time everything seemed to be going on well, a fatal result ultimately ensued, when the ligatures were found in the abdominal cavity resting in their own depôts of pus, having been thrown off from their attachments, and acting as foreign bodies. In two other cases which terminated favorably the silk ligatures by which omental adhesions had been secured were also discharged externally through the wound.

On the other hand I could quote two cases which went on without one bad symptom, in which four and six ligatures respectively had been employed without the slightest evil, the patients leaving the hospital well after an uncomplicated and steady convalescence; and many others could also be given in which the peduncle alone had to be secured and in which good results ensued.

I am free, however, to confess that the cases above mentioned have made me somewhat dissatisfied with the plan of treatment to which the peduncle had been subjected, although for short peduncles and broad attachments I at present know of no other which can be preferred; to the long and narrow peduncle the clamp may be as applicable, to say the least of it, and perhaps more so; still in other cases this plan of treatment by the clamp is far from satisfactory. Where the peduncle is short or broad it is certainly objectionable; for by the clamp fixed externally there is invariably traction upon the uterus and its ligaments, and this traction is the source of great irritation and consequently of danger.

I had hoped that in the actual cautery we should have found

the right means of treating the peduncle as well as omental and other adhesions. In fact some evidence has been given favorable to the use of the actual cautery in these cases ; but I regret to say that in my hands it has certainly failed. In the case of a girl aged twenty-two, whom I operated upon on November 20th, 1868, I burnt down the peduncle with the galvanic cautery with the greatest facility, and also one large omental adhesion, but hæmorrhage took place in the latter from a large vessel, the size of the ulnar artery, as well as from another point. I consequently ligatured the whole.

I must admit also that from the appearance of the carbonised surface I should not have returned it into the abdominal cavity without some misgiving, and I cannot help thinking that it must be as much a foreign body as a thin whipcord ligature. Still, from one case it is hardly fair to draw any conclusions, for if the peduncle had been the only part which required division, I should certainly have dropped it back tolerably satisfied with the effect of the cautery, and good success might have followed. It was perhaps unfortunate that in the omentum so large an artery as I have described should have existed, for it is unusual.

There is another lesson to be learnt from this case which must not be omitted, and it refers to the application of the ligature to the peduncle. That the peduncle should be tied in halves is a point which is generally recognised and needs no comment ; but that the ligatures should be crossed as illustrated in the woodcut on p. 230 is perhaps not sufficiently followed in practice. By doing so the chance of tearing the two halves of the peduncle asunder, and the danger of lacerating important parts are done away with. Again, should the ligatures set up ulceration in the part, they will both come away together, as in the case I have related.

It is well also to perforate the peduncle with a blunt-pointed probe, for a sharp needle may puncture a vein or other vessel, and thus cause a troublesome hæmorrhage ; in a case I had some years since such a result took place, and taught me the lesson I now repeat for the benefit of others. In ovariectomy success seems to turn much upon what appear to be small points, but as a life is often involved in their consideration, too much attention cannot be given to any that are of value.

The one I have mentioned must consequently be regarded as an important one.

ON MENSTRUATION FROM THE PEDUNCLE OF AN OVARIAN TUMOUR.

CASE.—Ovariectomy ; peduncle fixed by a clamp externally ; recovery ; discharge of blood from the end of the peduncle in the cicatrix during the menstrual flow subsequently.

This case has already been published in detail in my work on ovariectomy (*vide* Case 11). The patient, æt. 34, was operated upon on April 26, 1864, and made a rapid recovery, the peduncle of the tumour having been kept outside the abdomen with a clamp. In August of that year the catamenia appeared, and during this period there was a discharge of blood from the stump of the peduncle in the wound for two days ; the same discharge took place for four consecutive periods, when it ceased for two months, the catamenia still showing themselves with regularity. At the end of this time, however, the peduncle again began to ooze blood during the menstrual flow, and from that date, June, 1865, up to the present October, 1868, the discharge has been constant at those periods.

In another case also (Case 12)—that of a patient æt. 33—the same discharge of blood took place for six months during the menstrual flow after the operation ; after which it ceased, and when I heard of the patient some months subsequently, no return had taken place.

Remarks.—This question of menstruating from the peduncle of an ovarian tumour is one of great interest, and I know of no facts bearing upon the subject which have been published. The cases I have mentioned cannot be rare, and I trust other operators will give us their experience upon the point. The discharge is continually a source of annoyance to a patient under such circumstances, but it can hardly be brought forward as an argument of any weight against the practice of treating the peduncle by the clamp.

But out of this another question naturally arises : If the peduncle of an ovarian tumour discharges blood during the

menstrual flow when it is found externally, may it not do the same thing when it is dropped into the pelvis? I can hardly think that a peduncle fixed outside the abdomen would act differently to another which has been dropped in, and yet the evidence I possess so far seems to show that the former may discharge blood at the menstrual period, and that in the case of the latter there is no evidence to indicate such an action. I know of no instance in which a pelvic hæmatocele has formed after the operation.

The fact by itself, however, is worthy of a record and of further observation.

CASE OF
HYDATID TUMOUR OF THE ABDOMEN,
SIMULATING OVARIAN DISEASE,
TREATED SUCCESSFULLY BY OPERATION;
WITH REMARKS.

BY THOMAS BRYANT.

Case of hydatid tumour of the abdomen, simulating ovarian disease; treated successfully by operation.

(Reported by Mr. FREDERICK TAYLOR, M.B.)

Mrs. L—, æt. 35, a married lady without a family, was admitted into a private ward at Guy's Hospital in June, 1868, for an abdominal tumour under the care of Dr. Oldham and Mr. Bryant. The tumour had been gradually coming for fourteen years, and the patient had been seen constantly during the whole of this period by Dr. Oldham. It had commenced in the right side of the abdomen above the pelvis, and had gradually enlarged. It had caused at times some pain.

On July 14th, 1861, the cyst was tapped by Dr. Oldham, and seven pints of a clear fluid were drawn off. The tumour was always regarded as an ovarian cyst. Relief was afforded by the tapping for a time, but the abdomen soon began to fill again, and it was clear something must be done for her relief, for the tumour filled the abdominal cavity completely and caused much distress. It was as large as that in a pregnant woman at the full period.

Under these circumstances Dr. Oldham asked Mr. Bryant to see her in consultation on June 6th, when a careful examination was made. The abdomen was clearly much distended, and equally so on either side; but in the centre, midway between the umbilicus and pubes, a projection existed about the size of half an orange. This projection was very hard and tense, and was clearly cystic. It was much harder and tenser than the tumour which filled the belly. The large abdominal tumour had a peculiar feel; it was dull all over, and fluctuated indistinctly, but a wave could not be obtained through it as a whole. On kneading the mass with the hand on either side a peculiar doughy sensation was felt, unlike what is usually present in ovarian disease, but yet unlike what is usually felt in a hydatid cyst. Both loins were resonant. The patient's general health was good.

It was clear that the case was not a usual one, consequently the difficulties were explained to the patient and her friends, and an exploratory operation determined upon.

For this she was admitted, as already stated, into Guy's.

June 13th.—The patient was brought under the influence of chloroform, and an incision about two inches in length made in the median line of the abdomen, midway between the umbilicus and pubes, over the projecting cyst which has been already mentioned. At no great depth, apparently only beneath the integument, the cyst was exposed and punctured, a clear watery fluid, as found in a hydatid, making its escape. The cyst-wall was thick, white, and laminated, and was at once recognised as being a hydatid; the opening was consequently enlarged, and the parent cyst with a small secondary one turned out. The large tumour now came into view, covered with a thin layer of tendon or capsule; this was punctured, and the same kind of fluid escaped as from the smaller cyst. Mr. Bryant consequently dissected down to the cyst with some care and found it apparently closely connected with the abdominal parietes; at any rate it became clear that the abdominal cavity was shut out. The opening into the cyst was then enlarged upwards, and quarts of hydatids with their fluid were discharged. The cysts varied in diameter from half an inch to two or three inches; some of them were transparent and distended with fluid, others had burst and were empty. Some were shrivelled and opaque

white, having been dead for some time, and much of the fluid that came away was sero-purulent.

Mr. Bryant introduced his hand carefully into the mother cyst which extended upwards into the right side above the margins of the ribs towards the liver, and turned out all the cysts, many rolling out like tense balls; finally a large, thick, opaque, white cyst was removed in two or three pieces, which was clearly stained with biliary colouring matter—this was evidently the parent hydatid cyst. Altogether, upwards of seven quarts were removed. The cavity which contained this mass was then washed out with warm water. The walls of the cavity were vascular and very thick; it was completely shut out from the abdominal cavity, a firm membranous septum separating the two. It was impossible to make out with any accuracy the exact position of the hydatids; the large cyst was beneath the abdominal muscles, but apparently not in the abdominal cavity. It seemed, however, to be in contact with the liver from the discoloration of the cyst-wall.

The edges of the cavity were then stitched to the edge of the external wound by five or six sutures, an opening, three inches long, being left exposed. The wound was covered with a mixture of carbolic acid and oil, and the sides of the abdomen supported with a towel bandaged firmly round the patient.

Directions were given that the cyst should be well washed out daily, if not oftener, and plenty of nourishment ordered.

The patient recovered from the chloroform without difficulty, and had no subsequent sickness.

In the evening she had a morphia suppository.

June 14th.—Passed a quiet night, and has been in very little pain. She was sick once this morning. Skin hot, but moist. Pulse 120. Brandy, with milk and ice, were given.

15th.—The cyst was well syringed out with warm water; some few more hydatids came away mixed with a purulent fluid. There was no abdominal pain or tenderness.

From this date the sac was washed out daily, a flexible catheter being passed up into the top of the wound, and a steady stream of water passed through it; a good deal of thick purulent fluid was discharged, at times offensive, but never at all like that accompanying a sloughing hydatid cyst. The sutures were removed on the fifth day after the operation, and a healthy

reparative action rapidly appeared. The general condition of the patient was always good, although for some few days she was much troubled and depressed from an aphthous condition of her mouth. There was never any abdominal tenderness nor signs of inflammation within its cavity. About the 25th some diarrhoea set in; a little medicine, however, soon checked it. At the end of the fourth week the cavity had much contracted; it contained much less fluid, and what came away was healthy pus; all constitutional disturbance had fairly ceased. Her general condition was good. On July 11, the forty-eighth day, she left the hospital and went home, her residence being in a healthy part of the country. She bore the journey very well, having experienced only a little fatigue. Her medical man daily washed out the cyst. Her general health also rapidly improved.

Mr. Bryant saw her on July 29. He found her much improved; the wound was healthy and rapidly contracting; the cavity also was much smaller. Healthy pus came away daily after the washing. Her appetite was good. On August 12 she was still improving, and on September 1 the cavity had contracted so much as to contain only an ounce and a half of fluid. Mr. Bryant ordered the abdomen to be strapped up, and the patient to get up. By October 6 the wound had nearly closed. There was no sinus and no discharge, merely a depression. The patient was able to get up and walk about.

This large cavity had thus completely closed in sixteen weeks; not even a sinus remained. The general health of the patient never suffered materially from the first. The keeping the cyst empty was the only surgical point upon which stress was laid.

Remarks.—The first point that claims attention in the history of this case has reference to its diagnosis, for I believe it possessed features of so peculiar a nature as to form a guide for the future of no mean value.

It is true that the case from the very first was looked upon as ovarian. Its original seat about the right iliac fossa, its gradual and almost painless enlargement, its cystic nature, and, beyond all, the probabilities of the case, tended towards the promotion of that idea; and when it was tapped in the eighth year of its existence, and a thin clear fluid was drawn off, there

was nothing sufficiently unusual to lead Dr. Oldham to suspect it had any other than an ovarian origin. The thin watery nature of the fluid by itself was not enough to excite suspicion where none previously existed; for ovarian fluid is often thin and as often watery; although, had the fluid been examined and found to have been free from albumen, its true nature would doubtless have been discovered at that time.

The subsequent progress of the case also failed to excite any doubt as to its nature, it was so like that of ovarian dropsy; and it was not till a critical examination was made, with the view of an operation, that a suspicion was raised that it might be other than ovarian.

The first point that excited a doubt as to its nature in our minds was the presence of an independent cyst in front of the abdomen; and the strong fact that the small cyst was tense, globular, and hard, such as is seen in the hydatid tumour, whilst the large or abdominal one was doughy and free from tension.

The second point was that afforded by manipulation of the abdominal cyst. It was clearly fluid in its nature, yet no distinct wave could be detected through it as a whole, and from its outline it did not appear to be polycystic, so as to explain this fact; no ridges or septa could be detected on the most careful examination, and to the hand it appeared to be no other than one large cyst.

On kneading the abdominal tumour a peculiar sensation also was experienced; it was quite unlike that yielded by any ovarian or other tumour that I had ever felt: it had a special character which, I think, may be recognised again with tolerable facility. If I describe it as a doughy feel, such a word fails to express adequately the sensation that was experienced, yet it approaches nearer the truth than any other. It was clearly due to the rolling and pressing together the immense closely-packed mass of hydatid cysts that the parent tumour contained.

It was by the presence of these peculiarities in the symptoms that a doubt was raised, in our critical examination of the case, as to its nature. Every possibility was consequently discussed and carefully considered, and amongst these the question of hydatid was entertained. The clinical character of the small tumour gave rise to the idea, for it had all the local features of

the hydatid—a tense globular elastic cyst developing slowly and giving rise to no pain—but from the fact that the abdominal cyst had such different local features this view was almost dismissed. It remained, however, as one of the possibilities.

The doubt as to the nature of the tumour was, however, amply sufficient to induce both Dr. Oldham and myself to decide upon an exploratory operation.

We now come to consider the treatment of the case. Was it the best? Had we recognised the hydatid nature of the tumour beforehand should we have suggested a free incision into it and its bodily removal? It is a difficult matter to give an opinion upon a problem that has not been placed before us, yet I am disposed to think that the measure I adopted was the best, and that had I known beforehand the true nature of the tumour I should have acted as I did, for I believe the free evacuation of such a mass of hydatids as here existed to be the only means of establishing a cure, and that if the opening into the cyst be free and its cavity be well kept clean of any suppurative contents, evil results from such a practice are not to be looked for.

In a case of hydatid of the abdominal cavity of immense size, which was in Guy's some year or so since, and which was discharging itself at times through the vagina, I was anxious to carry out this practice, but circumstances forbade its execution.

Looking back upon the case, now that a recovery has ensued, I have no reason, scientifically, to regret the steps I took to get rid of the disease; and clinically the success was all that could be wished. The free opening into the cyst, and the care that was subsequently taken to wash out its contents and prevent anything like retention of purulent discharge, are the main points to which I would draw attention in its treatment. I would wish it to be read in connection with the observations I have already made in this volume on the treatment of Suppurating Ovarian Cysts, for it tends to support the practice I have there suggested.

A CASE IN WHICH
ANEURISMS OF THE TWO POPLITEAL ARTERIES
WERE
CURED BY DIGITAL PRESSURE;
THE ONE IN TWENTY-FOUR HOURS BY STUDENTS,
THE OTHER IN FOUR HOURS AND A HALF BY THE PATIENT;
WITH REMARKS.

By THOMAS BRYANT.

*A case in which aneurisms of the two popliteal arteries were
cured by digital pressure.*

(Reported by Mr. C. E. WING, dresser, and Mr. J. H. EWART.)

C. B—, æt. 32, a policeman, was admitted into Guy's Hospital on May 25th, 1867, under the care of Mr. Bryant, the case having been sent up to him by Mr. W. H. Wright, of Clapton Square. The patient, who was formerly a soldier, gave the following history. He had always enjoyed good health, had lived steadily, and never had syphilis. In January last he got wet one night whilst out on duty, and had subsequently what he called rheumatic pains in his *left* knee-joint. He sought advice and had his knee painted with iodine, and the pain went away in a couple of days. With the exception of this attack he has never had anything the matter with his knee.

About March 15th, 1867, he was taking a prisoner to the police station, when he was tripped up three times; he fell on his hands and knees, but did not hurt himself, he only felt a

little shaken. Next morning, however, he felt slight pain in his left popliteal space. This pain continued off and on for two months, till May 15th, but was not enough to interfere with the daily performance of his duties. On that day the pain increased, and was of such a severe shooting nature that he at once applied to Mr. Wright, his divisional surgeon. He was ordered to rest his leg and to apply a poultice, no swelling at that time being detected. On the second morning after seeing Mr. Wright, the patient noticed for the first time a swelling in his left popliteal space; he pointed this out to the surgeon, who at once recognised the true nature of the case, and sent him to Mr. Bryant, who admitted him into the hospital.

State on admission, May 25th.—He is a strong muscular man, well nourished, and healthy-looking. His appetite, however, is not good, and he does not sleep well at night. His left popliteal space is occupied by a tumour the size of a fist; this pulsates strongly; the pulsation can, however, be entirely arrested by pressure on the femoral artery, and the aneurismal cyst nearly emptied. He has no pain in the leg when at rest, but suffers severely on exertion. The right popliteal space is quite healthy.

29th.—The pulsation of the tumour is increased and the swelling larger. He now complains of pain in his left popliteal space and leg when at rest.

30th.—At 9 a.m. (Thursday) digital pressure on the femoral artery was commenced by students—each one taking an hour at a time; at 3 p.m., or after six hours, the sac seemed somewhat harder.

Friday, 31st.—Digital pressure has been irregularly kept up all night; the pulsation is less violent. At 3.30 p.m. pressure by means of a weight was substituted for digital pressure, and this was continued until 7 a.m. on Saturday morning, June 1st, when, on account of the pain being so severe in the left knee and leg, it was found necessary to stop the pressure. The sac at this time was somewhat hardened; the pulsation was also much diminished in force; the left leg was a good deal swollen. Digital pressure was again tried, but it could not be tolerated on account of the tenderness of the parts over the vessel. Pressure had been irregularly kept up for seventy hours. The patient was restless and a good deal

exhausted, having only had three hours' sleep since the Thursday morning.

June 1st.—Mr. Bryant saw this patient this morning at 9.30, when he was in a good deal of pain, and ordered him a subcutaneous injection of morphia; also Tinct. Hyoscyam. one drachm, Liq. Ammon. Acetat. two drachms three times a day.

2nd.—Towards evening he complained of great pain in his knee and leg. The house surgeon injected subcutaneously twenty minims of the solution of morphia, which eased the pain and gave him some sleep.

5th.—The patient sleeps better of a night, and is now quite calm again.

15th.—To-day Mr. Bryant bandaged the man's leg from foot to thigh, and flexed both the leg upon the thigh and the thigh upon the pelvis. This position entirely arrested the pulsation in the sac, but after the lapse of five minutes the pain became so great that the bandage had to be removed.

19th.—This morning at 9 a.m., digital pressure was again had recourse to; but on this occasion three experienced students were on duty at the same time for two hours, each man pressing on the femoral artery for ten minutes, Mr. Bryant wishing the entire flow of blood into the sac to be arrested. When the pressure was recommenced the tumour was hard and pulsating very strongly. 10.30 p.m.—The pain in the patient's knee and leg was so severe that pressure could hardly be tolerated; thirty-five minims of solution of morphia were consequently injected beneath the skin; this relieved the pain, and at 11 p.m. the pulsation in the tumour ceased for the first time. Pulsation, however, recommenced about 12 o'clock, and continued to cease and to reappear in the tumour till 9 a.m. on Thursday the 20th, when the pressure which had been well kept up for twenty-four hours was stopped, for the tumour had completely ceased to beat. Uninterrupted pressure had been kept up for fourteen hours, and with occasional momentary intermissions to test pulsation for another ten. About 1 o'clock in the morning of the 20th, or fourteen hours after pressure had been applied, a small cutaneous artery was felt beating over the centre of the tumour, and another also on the outer side of the sac.

21st.—This morning the man is very comfortable; he has no

pain, and there is no pulsation in the tumour. Towards evening he complained of his right leg feeling cold and numb—a hot water bottle was applied.

22nd.—Complains of headache; bowels not open. Ordered saline rhubarb powder, half a drachm at bedtime.

23rd.—The powder acted freely and the patient feels comfortable. The aneurismal tumour is quite hard and free from all pulsation.

July 11th.—Has been going on well in all respects. Mr. Bryant allowed him to sit up in a chair this evening; he also walked with the aid of crutches.

20th.—Allowed to walk about for the first time.

22nd.—He is in the grounds to-day and can walk pretty well with the aid of a stick.

24th.—Walks well; does not complain of any cold feeling in his foot, except in the big toe.

27th.—Can walk quite naturally and bend the leg upon the thigh as freely as he ever could. He has no pain. Occasionally the great toe of the left foot feels cold after exercise. The aneurism feels like a hard solid tumour, about the size of an egg.

The man was discharged to-day cured.

Report of aneurism of the right popliteal artery cured by pressure in four hours and a half.

The following report of the aneurism of the popliteal artery of the right leg, and the history of the case after the man left Guy's, are from the pen of Mr. W. H. Wright:

After leaving the hospital the patient went into the country for a month, and on his return was put upon light duty for another month. At the end of this period he resumed ordinary duty, the leg being now perfectly well, and at this he continued until May 4th, 1868, a period of seven months, when he became incapacitated and went upon the sick list. On presenting himself for examination, he stated that three weeks previously, while walking on the kerb at night, he slipped, and felt at the time as if something had given way in his *right leg*; it caused him some slight pain at the moment, but he took no further notice of it, and continued on duty day after day, until gradually increasing pain in the leg and difficulty of walking compelled

him to desist. He complained much of pain on the inner side just below the knee, and on the outer side as far down as the ankle, and upon examining the leg, this was found to be due to an aneurism of the popliteal artery about the size of an ordinary hen's egg. He was sent home, ordered to keep perfectly quiet in bed, and opium was given to relieve the pain, which was particularly severe at night. As digital pressure had been so successfully employed in the first instance, it was determined to resort to the same method of treatment again; as this, however, generally required more than one pair of hands, and more are not always available in private practice, some days elapsed before the necessary arrangements could be made; and one evening whilst suffering more pain than usual, and recollecting how he had been cured on the former occasion when in hospital, the patient determined to commence the treatment himself; he, therefore, began by pressing with two fingers on the artery in the groin, and using alternately the right and left hand, he kept up pressure firmly, steadily, and uninterruptedly for four and a half hours, when from sheer exhaustion he was obliged to desist. His efforts, however, had been successful, for pulsation had at that time ceased,¹ and when seen the following morning, it was found that the aneurism was cured. Not the slightest pulsation was to be detected in the ham; he was free from pain or uneasy sensations in the leg. At the end of a week he complained only of slight stiffness in the knee, and in ten days he was able to walk a little about the room. After the lapse of a fortnight he could walk about two hundred yards, when he would feel a dragging sensation or cramp in the calf of the leg; this, however, gradually passed off, and he was able to resume duty on the 31st of July, somewhat less than three months from the date of treatment, and has continued perfectly well up to the present time (Oct. 24th).

I may add that through Mr. Wright's courtesy I had an opportunity of examining this man after his recovery. He had at that time a solid tumour, the size of a large egg, occupying the right popliteal space, and in the left the original aneurismal tumour was about half that size. In all other respects he was quite well.

¹ The truth of this fact is supported by the patient's wife.

I strongly advised him, however, to look out for some light employment ; the risks of a constable's life being too severe for a man clearly disposed to arterial disease.

Remarks.—This case of aneurism of both popliteal arteries has been deemed well worthy of record from the fact that the disease was cured in both instances by digital pressure ; in one instance the pressure having been applied by trustworthy and educated senior students ; in the other by the intelligent, and I may add educated, patient. In the former case the pressure was applied for twenty-four hours ; in the latter for only four hours and a half.

In the treatment of the first aneurism there is little to be remarked upon, with the exception of the method by which the practice was carried out—three good men having been selected to take charge of the case for two hours at a time ; no one being called upon to apply pressure for more than ten minutes together. By this arrangement the fingers of the students were never fatigued, and the flow of blood through the aneurismal sac was completely arrested.

I believe that three men might readily take charge of such a case for four hours at a time without fatigue.

That aneurism can be cured by pressure is now a truth that needs no proof, but that a greater success than has yet been obtained is to be acquired by a better mode of its application is, I believe, equally recognised by all surgeons.

That digital pressure, when well applied, is better than instrumental can scarcely be disputed, although when it is indifferently carried out it is probably less to be relied upon and less efficient.

To expect any one of ordinary physical power to keep up a steady pressure sufficient to arrest the flow of blood through a large artery for many minutes consecutively is altogether vain, and for an uneducated student to make the attempt is clearly an error, for he will, to a certainty, worry the patient with his anxiety to do what is right, and pain him by the diffused and uncertain pressure of his fingers, and the friction resulting from their continual movements. He will press on veins and nerves, as well as artery, and thus cause distress.

What is wanted is the steady equal pressure of a finger or

thumb applied directly over the vessel which is to be compressed; the pressure being so regulated as to be just sufficient to arrest the flow of blood through the artery, but no more. Neither vein nor nerve need be much pressed upon as a rule nor much pain generally produced.

Greater pressure than that indicated above is a waste of strength on the part of the surgeon, and is a needless cause of distress to the patient.

In London hospital practice it is doubtless from the want of attention to the above requisites that the treatment of aneurism by pressure has been so unsuccessful; it has been too frequently inefficiently practised, and has consequently failed.

Beyond pointing out the way in which pressure should be applied for the cure of aneurisms, the details of the case above fairly prove it to be essential for a speedy cure, that the flow of blood through the aneurism should be completely arrested, and that an intermittent flow of blood through the sac is unsatisfactory and unsuccessful; for in the early treatment of the case when the intermittent method was practised, failure followed; in the later, when the flow of blood was completely arrested, a speedy cure ensued.

The main interest of this case lies, however, in the fact that the patient himself was the successful operator in the cure of the second aneurism, and that only four hours and a half were required to complete the cure. In these points I believe the case to be almost unique. It is true there is another case recorded by Mr. Holmes in his '*System of Surgery*,' vol. iii, p. 422, in which the patient cured himself of a popliteal aneurism by pressure, but in that instance the cure required three days for its completion.

In the case I now publish I have no doubt that the pressure was constant, and that the flow of blood through the aneurism was completely arrested for the four hours and a half, for the man knew too well, from former experience, what was required to effect a cure, and had the power and energy to carry it out.

It is—as Mr. Wright has well remarked in his notes on the subject—"a remarkable case of self help, and fairly illustrates the advantage of digital pressure over the less manageable and more complicated treatment by instrumental compression."

ON THE MORBID ANATOMY
OF
ELEPHANTIASIS GRÆCORUM.

By W. MOXON, M.D.

IN the last volume of the 'Guy's Hospital Reports' is an account of a case of Elephantiasis Græcorum by Dr. Owen Rees. The death of the miserable lad, which happened on February the 16th, 1868, gave us an opportunity of making a careful post-mortem inspection, which threw a fresh light on many interesting particulars observed in his case during life. The morbid appearances which were revealed correspond to a certain extent with those described by Danielssen¹ and Boeck, and also by Dr. Carter,² but some of the facts ascertained differ from those recorded by these observers. Their inspections were made upon subjects who had passed through the disease in all its stages in its natural haunts; on the other hand, the present case was not exposed to the climatic causes of the disease during the last two years of his life, and such a relief from its causes may have modified the results of the disease. Dr. Rees' account of the case ceases July 14th, 1867. Its subsequent course was only a continuation of the same symptoms, with gradual sinking in a state of extreme emaciation and exhaustion.

The post-mortem examination was made on February 17th, 1868.

There were signs of puberty; but all parts of the body had an ill-developed look. On inspection the frame was short and stunted-looking. He had a good head of light brown curly

¹ 'Traité de la Spedalskhed,' 1848.

² 'Transactions, Medical and Physical Society of Bombay,' vol. viii.

hair, it never fell off during his illness. Emaciation extreme; the anterior spines of the ilia came nearly through the skin, which was half ulcerated through over them; yet there was but little bed sore in the usual places over the trochanters and sacrum, where there was no more destruction of skin than over the spines of ilia. The state of the knees was worse; here the ligamentous covering of the patella lay bare under a porous rupia-like crust that only partly covered it. There was indeed no trace of the tegument over the knees. Rupious crusts of the same sort were scattered over the front of the legs, increasing toward the toes; the skin between these was dark earthy brown in colour. A like state of the arms was present, increasing towards the finger-tops. The right arm was much more affected than the left. The face and upper part of the neck were also studded with the same crusts. There were only a few small irregular eyebrows to be seen between these crusts. The surface of the skin of the face that during life was raised in elevations was now almost completely even, it had a chaffy scaly look. The nose was reduced to a stump, the nostrils dry and containing the same sort of crusts as those on the face. The ear lobes were thickened. The teeth were sound. The neck, trunk, buttocks, perineum, and genitalia were quite free from disease, so were the shoulders and hips. The wasting of the skin was so great that a suture would not hold in it; it tore when one was holding it in one's fingers to use the knife in dissecting it off; indeed, it was absolutely rotten. The cranial bones were quite free from disease, the calvaria rather thick.

There was some slight thickening of the upper half of the arachnoid and pia mater; as usual in wasted subjects. The brain and its nerves appeared perfectly normal, the weight of the organ was forty-six ounces, so that it was very little below the common standard. There was but little complementary liquid on the surface of it.

Upon the upper half of the right pleura, especially anteriorly, were numerous tubercles which had an ordinary appearance. The anterior parts of the left pleura were covered with small whitish tubercles. It was curious that in both pleuræ these tubercles affected the anterior parts, which were uppermost in his continual supine position.

In the antero-inferior part of the right lung was a cavity of a size to hold a small plum; this had the ordinary appearance of a tuberculous cavity. In the antero-inferior parts of the lungs were, on any section, several clusters of yellow tubercles with pale greyish circumferences; the paleness of the lung gave a peculiar appearance to these, otherwise I think they would, on careful observation, have gone for ordinary tubercles.

The anterior ends of the false vocal cords showed symmetrical patches of pale-coloured yellowish thickening without ulceration. The fauces beside the root of the tongue and behind the tonsils showed a yellow opaque thickening about the pharyngeal glands. The only peculiar appearance on the whole interior of the body was here and on the back of the soft palate, where a patch existed in the middle line almost exactly symmetrical; these patches all had raised edges and depressed centres, and were opaque cream-white on the pale ground of the palate; they had much the appearance of the patches on his face, allowing for difference of surface on which they arose. Beside the larger patch there were several smaller patches on the palate. The heart weighed four and a half ounces, it was a very small organ, lessened uniformly in all its dimensions, but quite healthy. Its small size concurs with clinical history in showing the phthisis to be recent. The aorta and large vessels were quite healthy. The left femoral vein was full of softened ante-mortem thrombus; this fulness of the vessels extended down the limb to the lowest part, but the vessels became very small as we traced them.

The œsophagus was quite free from disease; the stomach was also quite free from local disease; it was contracted, its mucous membrane was lardaceous to a moderate extent, and its surface a little mammillated.

The small intestine was highly lardaceous, there was only one patch of local disease, and that was about four inches above the ileo-cæcal valve in a "Peyer's patch;" it had the ordinary appearance of a tuberculous ulcer.

The liver weighed 110 ounces; it was perfect in outline, sharp at the edge, deep in vertical diameter, and had no adhesions anywhere to parts around; it had on the surface a finely mottled appearance, the colours being opaque yellowish, and semipellucid brownish and reddish-grey colours. These

were less finely mingled on the surface of the section, where there were larger patches of the red-grey element. This latter part was very highly lardaceous, the former was fatty; the opaque yellow fatty part was, however, not free from lardaceous matter.

The pancreas was free from lardaceous and other disease.

Both the mesenteric glands and the upper lumbar glands had tubercles in them in the form of fine yellow grains and nodules.

The spleen weighed ten ounces, its malpighian corpuscles were lardaceous.

The kidney weighed seven ounces, there was no unusual hardness. On adding iodine to the section some black spots came out on the cortex, and fine black lines came out plentifully on the section of the pyramids, so that there was a marked lardaceous change in the whole organ, chiefly in the pyramids.

During life, nodules could be felt under the skin in the forearm and elsewhere, and these were thought to be in the nerves; it was, therefore, with interest that the nerves were searched and compared with the corresponding nerves of another body. The ulnar, sciatic, and radial nerves were those compared: neither of these nerves had an unusual size. My own impression was supported by Mr. Bankart, Dr. Pye Smith and Dr. Phillips, who saw them also, and believed them to be of the usual, or less than the usual size. The ulnar differed from the ulnar of another case, in having a rather thickish coat about it. When this was removed there remained nothing remarkable in the nerve as far as the naked eye could judge; the radial and musculo-cutaneous nerves were natural. The sciatic and popliteal were adjudged to be less than natural. The sciatics of the other body (adult) were twice the size of the boy's, in either case about six inches of the nerve were examined. The musculo-cutaneous was examined in the right foot and leg, and found to be of the usual appearance. Thus, the nerves showed nothing remarkable. The nodules observed during life were on the *veins* (Plate I, fig. 1) forming whitish-yellow thick spots upon their walls, varying in size; pus-like liquid could be squeezed from these nodules in some cases. The veins of both fore-arms were examined, and in both the same state was found. There were six nodules on the veins of the back of the hand, and many of all sizes on the back of the forearm.

In the right foot there were none of these nodules to be found. The dorsal arch was impervious, dead, and closed up, but it was thin and uniform, its contents being brown in colour. The cellular tissue of the foot had a remarkable ochrey-red colour and was of rotten-like consistency.

The lymphatic glands of the right groin were enlarged, those of the left less so, those of the axillæ much wasted. The whole of them presented a very peculiar appearance and colour; generally this was orange-brown, rather a fine colour. The surface of the section was mottled and marked with curved lines, so that a section looked like the corpus dentatum of the olivary body.

On surveying generally the diseased conditions found in the body, we are struck with the small extent of morbid change proper to the leprosy. The immediate cause of death was amyloid or lardaceous disease of the alimentary canal, liver, kidneys, and spleen, with marasmus in the most extreme degree. I am not aware that amyloid disease has been before noticed as occurring in leprosy. Although "lardaceous" changes are spoken of by Danielssen and Boeck, and by other authors, the word "lardaceous" was applied by them in a different sense; they speak of lardaceous infiltration of the skin, and about the superficial veins, and of the kidneys, and by that word they only signify a certain homogeneous appearance. The matter in the skin and around the veins, which they call lardaceous, was almost certainly not amyloid. The state of the kidney described by them, and which they say was accompanied by albuminous urine, in all probability was amyloid.

When those authors wrote our present knowledge of amyloid disease was not in existence. It is well worth our attention to observe that in leprosy, which is a remarkable and most peculiar disease—a disease more strictly "specific" than any other—the ordinary situations and the common appearances of amyloid degeneration are observed in their usual characters, and that the amyloid change of the viscera, which supervenes to finish so many lingering but not otherwise mortal maladies, should have been, as it were, required to put an end to life after so long a course of leprosy.

With regard to the cause of the amyloid disease of the viscera, we may remark the usual association of it with prolonged

suppuration, which had for years more or less affected the skin of the face and extremities.

The state of the heart is worth noting, its weight was remarkably small, corresponding only with its extreme smallness in cases of marasmus from cancer. From this smallness of the heart we may conclude that probably no morbid condition of the blood existed. If the blood be imperfectly aërated, or imperfectly purified through defective action of the kidney—as in cases of phthisis or renal disease—then, however much the body may waste, the heart maintains a natural, or acquires an increased size. We may conclude that, as the heart was small, the blood was accepted for healthy by the tissues in its capillary circulation.

The entire freedom of the vital organs from those tubercles which are described as plentifully present in very advanced and severe cases of leprosy is a point of interest; seeing that the patient lasted out apparently to the utmost possible extreme. May this be owing to his removal from the country in which leprosy is endemic to our own country, where it is practically unknown, or, in other words, where the conditions are unfavorable to it?

The condition of the lungs was worth noticing because of the presence of tubercles like to common yellow tubercles in their appearance, and in their tendency to break down at the centre, but differing from the tubercles of common phthisis in their position at the lower anterior part of the lungs. The experiments which have recently been made by many observers since M. Villemin asserted the inoculability of tubercle go to show that, at least in certain rodents, the continued presence of suppuration in the cellular tissue leads to the formation of a secondary nodular disease of the lungs, with characters partly like tuberculosis, and partly like pyæmia. The softening tubercular nodules in this lung had quite the appearance of these secondary tubercle-like changes in rabbits' lungs, and, it is fair to suppose, may have had the same origin; that is, they may have arisen by the extension of diseased elements from the cutaneous leprosy to the lung, so that they were truly pulmonary leprosy. If this opinion is objected to, some cause is required to explain the position of the tubercles in the lower half of the lung instead of the upper, which is their almost constant situation. It might be suggested as an alternative

that the boy's posture on his back in bed—for he was totally bedridden during the later months of his life—made the anterior parts of the lungs come uppermost, and so take the position of the apex, and with the position of the apex its diseased liabilities. Or it may be thought sufficient to reflect that, as commonly stated, tubercle sometimes attacks the lower part of the lung, and not the upper; such cases are, however, exceedingly rare, and, as far as I have seen, always arise under peculiar circumstances, such as to suggest a secondary origin.

The condition of the larynx, fauces, soft palate, and nares corresponds exactly with what is described as usually present in leprosy. Separate and confluent yellowish tubercles of low elevation were present in considerable quantity. Two points are worth notice respecting them. Firstly, that the tubercles in the larynx occupied a totally different position from that of ordinary tuberculous disease of the larynx. They were about the anterior ends of the vocal cords, instead of the posterior, where tuberculous ulcers are always seated. And secondly, that the tubercle showed no disposition to ulcerate; whereas phthisical tubercles without ulceration are practically unknown about the larynx; indeed, in and about common "tuberculous" ulcers of the larynx no tubercles are to be seen. Lastly, the state of the skin and subcutaneous tissue was very interesting and remarkable; the skin of all parts of the body had undergone excessive atrophy, so that a suture would not hold in it; and when held up in one's fingers in the ordinary process of dissecting it back to expose the subcutaneous parts, it tore across with very slight tension; it had entirely lost its elasticity. This state was in a great measure, if not entirely, due to the general wasting of which it was a part. I have seen a close approach to the same degree of atrophy of the skin in a case of excessive emaciation from hip-joint disease, in which case, as in this leprosy boy, the mere weight of the bedclothes had caused the crest of the ilium to protrude through the wasted skin, and in stitching up the body the sutures tore their way out. This wasted state (with dark discoloration) was all that could be seen after death in the skin of the fore-arms and hands, there were no tubercles present. There was no tendency to wasting of the phalanges. There were some rupia-like crusts scattered about on the hand and forearm, but the skin under them scarcely differed from that

around. The skin was easily separable here from the subcutaneous tissue, its relation to this was not altered, and on reflecting it, which was easily accomplished, the superficial nerves and veins came into view embedded in cellular tissue which only differed from its natural state in the smallness of its quantity, the duski-ness of its colour, its want of tenacity, and the exceedingly small traces of atrophied adipose tissue present in it. Contrary to expectation, the nerves were found quite natural, perhaps a little smaller than usual, or a little thicker in their sheaths, but this is very doubtful. There was practically no change in them; the nodules which had been felt during life, and which had been supposed to have their seat on the nerves, were found to belong to the veins. Plate I, appended to this paper, shows the curious appearance presented by these, which is quite unlike any pathological appearance I have ever met or seen described. Daniels-son and Boeck describe the veins as much thickened where they pass through the lardaceous thickenings of the subcutaneous tissue described by them; and they say that this state of the veins is proportionate to the degree of the disease around the vein at the spot affected. The veins of this boy's forearm, however, presented these remarkable nodular formations of the external coats at points where no disease of the surrounding tissue was present; indeed, there was no disease of the subcutaneous tissue of the forearms. At first I thought that the diseased products might be in the lymphatics about the veins, but microscopic examination of sections showed that the disease was in the tissue of the vein wall chiefly toward the outer part, and consisted in the formation of a cellular structure whose cells were of considerable size, and attached to an intervening fine fibrillar network, so as to form a tissue like that of lymphatic glands. Compare fig. 2, Plate I, with fig. 2, Plate II. The structure here seen resembles closely that figured by Virchow ('*Krank. Geschwülst.*,' p. 514), as found in the cutaneous tubercles in leprosy.

The lymphatic vessels were not diseased, but the glands of the inguinal and axillary regions showed peculiar changes, which were curiously limited to spots in the glands corresponding to points of entry of the afferent lymphatics. Near each of these the tissue of the gland showed a change of colour to a dark brownish hue, and this changed part was bounded and separated

from the rest of the gland by an irregular line of darker colour, giving the appearance as though an excessively slowly creeping change was extending from the afferent lymphatics into the substance of the gland. Nothing could better signify the excessive slowness of the leprous process.

The lower extremities were in a different state. Here the skin and subcutaneous tissue as high as the knee were continuous with each other, being, as it were, consolidated together by a single gelatinous change, which appeared to consist in a combination of atrophy and *œdema durum*. To this state the word lardaceous would probably have once been applied; but it must not be confounded with the true amyloid condition to which the application of the word lardaceous is now restricted. There was no change on the application of iodine. Embedded in this hard, wasted œdematous tissue, the musculo-cutaneous and other nerves were found remarkably healthy, both at the points where they pierce the fascia, and at all other places. On the other hand, the subcutaneous veins were only to be found as reddish ochre-coloured, imperforate bands, not differing in consistency from the gelatinous stuff around, so that it was impossible to dissect them. Yet the coats of the vessels showed none of the change observed in the veins of the upper limb. There were no tubercles now distinguishable in the skin of the foot; the bones were soft, the muscles excessively wasted. The freedom of the brain and the spinal cord, and the maintenance of the size and weight of these organs in the presence of such excessive emaciation, are very interesting, and correspond with the complete clearness of the lad's intellect up to the time of his death.

On the whole, this case brings prominently forward, as a distinguishing feature in leprosy, the excessive slowness of the process, and the little tendency to a fatal issue which it shows under its worst forms; indeed, if it killed more speedily it would lose much of its horrors, which it owes, no doubt, to the tedious and protracted suffering and miserable disfigurement which it brings upon its victim, while refusing to relieve him by a reasonably speedy access to that fatal termination which is the only end it promises to his hopes. Many cases of *Elephantiasis Græcorum* are reported to have suffered from albuminuria towards the close of life. It appears to me probable that this

may have been due to amyloid degeneration of the kidney, as in the case before us. Again, the diarrhœa and dysentery to which these sufferers are liable as their end approaches may have been due, in many cases at least, to the amyloid degeneration of the alimentary canal, which I believe causes the most obstinately irremediable diarrhœa. The premonitory rheumatics and languor, &c., of leprosy show a constitutional state of which the disease of the skin is only a part. Yet it appears that the eruption upon the skin and mucous membrane, extending by contiguity to the nerves and veins, is the only proper or primary local change. The tuberculated state of the serous surfaces and liver, &c., sometimes found, if not of ordinary tuberculous nature, as suggested by Virchow,¹ stands to the disease of the skin in the relation of secondary disease analogous to the suppurations which may occur in deep-seated parts in the secondary fever of smallpox.

The relation of leprosy to lardaceous affections serves as a further link between it and syphilis. The one disease resembles the other as a slowly-developed, prolonged, tenacious, specific fever, which is neither able to kill by the fever itself, nor even generally by its local sub-diseases.

¹ Virchow, 'Krankhaften Geschwülste,' bd. ii, p. 509. "Danielssen und Boeck eine ganze Reihe von tuberösen Erkrankungen der Lungen, der Leber, des Bauchfells u. s. w. in dieselbe Gruppe (as the skin tubercles of leprosy) setzen, während es sehr wohl möglich ist, das eine gewisse Zahl davon als wahre Tuberkel zu betrachten ist."

DESCRIPTION OF PLATES

To accompany Dr. Moxon's paper.

PLATE I.

Fig. 1. The flesh removed from the bones of the right forearm, and spread out to show the state of the subcutaneous veins and nerves, which have been dissected out.

v v. The plexus of superficial veins much thickened and swollen at intervals into rounded knobs of different sizes.

n n. The nerves in a natural state.

Fig. 2. Microscopic appearance of a radial segment of the wall of the swollen vein.

The middle part of the figure shows the appearance of the whole segment by $\frac{2}{3}$ rd inch power. The upper and lower show specimens of the elements composing the segment. The letters in the $\frac{2}{3}$ rd inch figure correspond to the same letters in the 5th.

l is the epithelium of the lining membrane, which is still present; there is no exudation in the interior of the vein.

c, part of the elastic coat.

m, muscular coat.

PLATE II.

Fig. 1. Section face of lymphatic gland from groin.

e, efferent lymphatic.

a, afferent lymphatic; around the points of entry of these there is a curious transformation of the lymphatic gland.

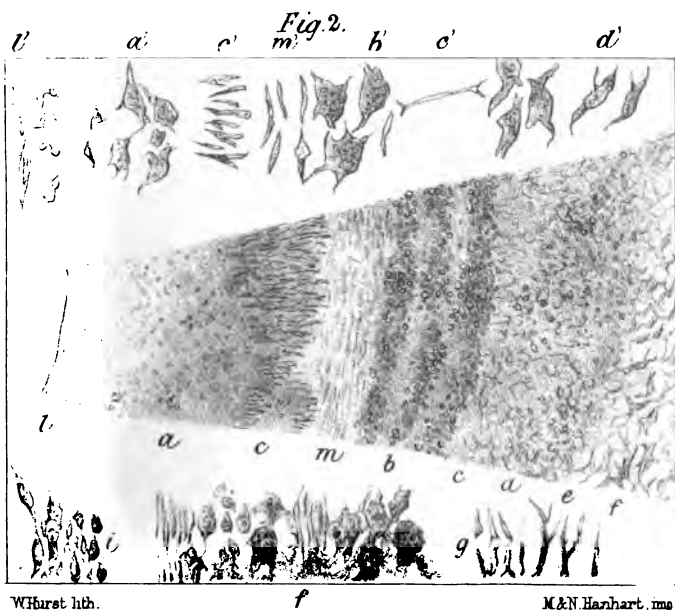
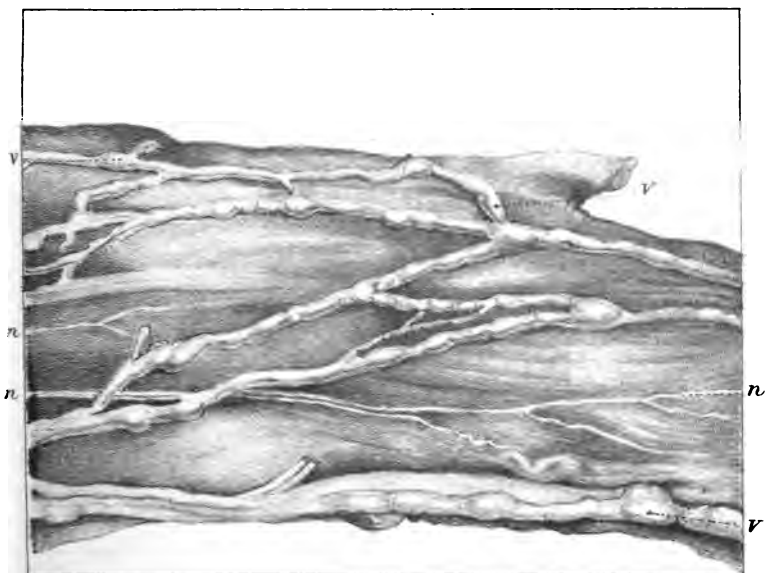
Fig. 2. Part of section of the gland substance seen by $\frac{1}{4}$ th inch power.

c, capsule.

t, tissue of gland composed of the same elements as those in the vein wall. Plate I, fig. 2, *a' b' d'*.

Fig 1

Plate.1.



W. Hurst lith.

f

M & N. Harshart. imp.

1. The first line of the document is a vertical line.

2. The second line of the document is a vertical line.

Fig. 1.

Plate 2

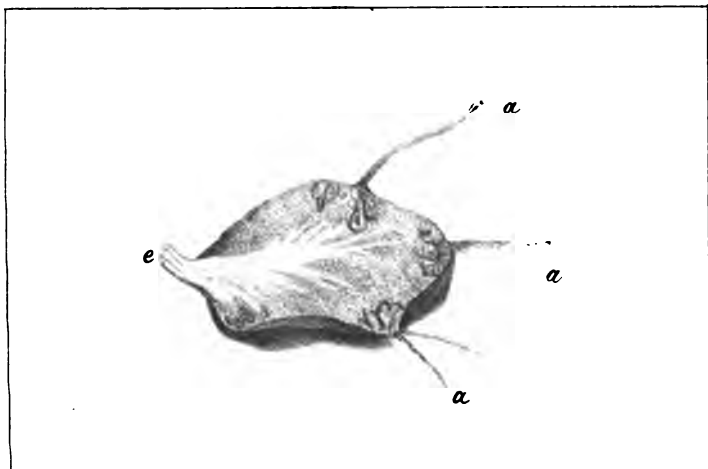
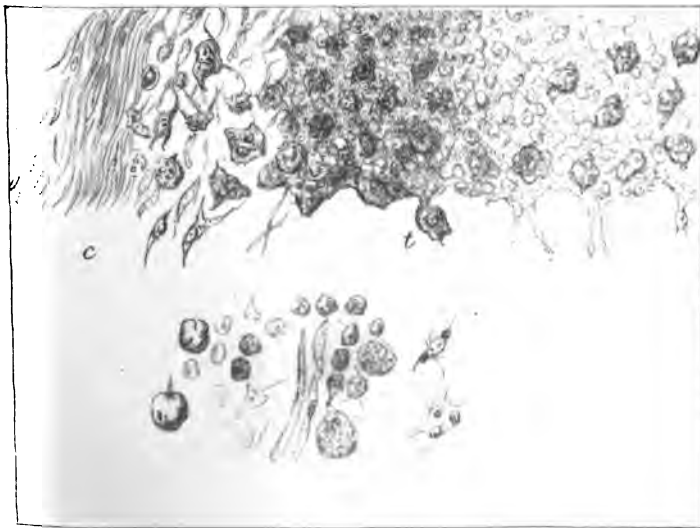


Fig 2



W. Hurst. Lith.

M. & N. Hanhart. imp.

TOXICOLOGICAL CASES.

By THOMAS STEVENSON, M.D.

Poisoning by hydrocyanic acid.

For the particulars of the following case, in which the patient, though ultimately succumbing, survived an hour and a quarter, I am indebted to Dr. Fagge. Dr. Fagge says: I was called from my then residence in Trinity Square, in conjunction with Dr. Phillips, to a house in Merrick Square to see a medical student of another hospital, who had, it was stated, taken prussic acid. On our arrival we found Mr. J— lying on the sofa quite insensible. The limbs were paralysed, and lay in whatever position they were placed; and they were free from all rigidity. The jaws were clenched. The pupils were nearly natural, neither markedly dilated nor contracted. Subsequently they became dilated. There were no convulsions, nor, as we were informed, had there been any.

The history given was that the patient had been drinking for a week past, and that he had been in difficulty from not being able to get his papers signed at his hospital. He had come in about two hours before our visit. A policeman told us that he had seen him then, and that he was not apparently otherwise than sober. A gentleman who slept in the next room to his, communicating by means of folding doors, told us that he had heard Mr. J— call to him once or twice; that he ran into his room, and that he heard J— fall from the sofa to the floor, where he found him as soon as he could light the gas. He was then already insensible.

In addition to the symptoms already mentioned, it is to be

noticed that the face was not livid. The pulse was very rapid; the respirations on the other hand very infrequent.

It was ascertained that he had purchased three drachms of Scheele's acid that evening, and a corked bottle containing about a drachm and a half of that acid was found on the table.

Cold water was dashed on the face and chest. This at first excited deep respiratory efforts nearly every time it was done. Attempts were then made to make him swallow some mustard-and-water; but, although a movement of deglutition was distinctly noticed once or twice, the fluid remained in great part in the mouth, ebbing and flowing with the respiratory movements. It was, therefore, thought better to abstain. The cold affusions were continued, and a messenger despatched to Guy's for a stomach-pump and a galvanic battery. Some strong ammonia was fetched from a druggist's; but as its application to the nostrils failed to produce the slightest stimulation, its application was not repeated.

After a time the respiration became slower, and it was counted at seven in a minute. Each breath seemed as if it would be the last. The breathing was also distinctly stertorous, and froth appeared at the mouth, forming large bubbles. This fluid was so viscid that it could scarcely be wiped away. The pulse became slower, and markedly feebler; and now cold affusion failed to produce any effect.

At last the respirations were counted at four in the minute, the pulse became imperceptible at the wrist, and the face became blue. Breathing ceased just one hour after Dr. Fagge reached the house, and from one and a quarter to one and a half hour after the discovery that Mr. J— had taken the poison. Just at this moment the galvanic battery arrived. The current produced contractions of the pectoral muscles, and even of the arms; but it did not in any degree produce respiration. Its application was therefore not persisted in. There was a marked odour of prussic acid in the room; but it was not noticed at first whether the breath smelt of the poison. When Dr. Fagge attempted to smell the poison he failed.

No *post-mortem* examination was made.

I know of no previously recorded case where the patient has lived so long after the administration of a fatal dose of prussic acid.

Death from the inhalation of chloroform.

Jephtha M—, æt. 33, a farm labourer, was admitted under Mr. Cock, September 12th, 1868. The patient was a powerful muscular man who had always enjoyed good health. He was admitted for an old distortion of the ankle-joint, the result of an accident; and it was proposed to divide the tendo Achillis, and to straighten the limb. Before admission he expressly stipulated that he should have chloroform administered previous to being operated upon, concealing the fact that eight years before he had nearly died in St. Bartholomew's Hospital from the effects of that anæsthetic. After his death, however, it transpired that he had communicated this circumstance to two fellow patients, and also that on the day of his death he had received a letter from a friend, urging him, on account of the risk he had previously run, not to have chloroform.

On September 16th chloroform was administered by means of an inhaler. This consisted of a metallic mask for the nose, lined with lint, and furnished with two holes for the admission of air, but having no valves. For about two minutes he took the chloroform quietly, and seemed to be becoming insensible in the ordinary manner. He then began to struggle violently, and this continued for about a minute; he also ground his teeth, and the face became much congested. During this time the anæsthetic was given freely. The pulse could be felt with difficulty during the stage of excitement, but at its close it became intermittent. He then became insensible, the chloroform was withheld, and the operation commenced. The pulse became regular, about sixty per minute. He continued in this state for about a minute and a half, when, after ten or twelve intermittent beats the heart ceased to pulsate. He was placed head downwards at an angle of 45°. Artificial respiration and other means of resuscitation were employed, but without avail. For three or four minutes he continued to give an occasional deep gasp; but finally all signs of life ceased.

The autopsy was performed twenty-four hours after death. Rigor mortis was present in the lower, but was feebly exhibited by the upper, limbs. The countenance, which bore a placid smile, was deeply congested, and the ears and neighbouring

parts were quite black. The whole of the front of the chest, the neck, shoulders, &c., were extensively ecchymosed, the ecchymoses being diffuse, mottled, and of a deep violet hue. The scrotum was also ecchymosed. The conjunctivæ were not blood-shot, but the eyelids were deeply injected, and the upper left lid had a small patch of ecchymosis upon it. A triangular patch on the face contrasted by its paleness in the most marked manner with the surrounding lividity, and showed the exact spot which the inhaler had covered. The cranium was the first cavity opened. The sinuses and vessels were gorged with dark fluid blood, which scarcely coagulated even after a couple of hours. Some of this blood was placed in a stoppered bottle for subsequent analysis; portions of the brain and of the liver being likewise reserved in separate corked bottles for the same purpose. Two or three small ecchymotic patches were observed beneath the arachnoid, but nothing else unusual was observed. The lungs were very much gorged with blood posteriorly, from post-mortem gravitation, and there were also several apoplectic patches, showing that before death there must have been considerable obstruction to the pulmonary circulation. The heart was nearly empty, but not contracted. Doubtless the blood, through its great fluidity, had drained away from this organ when the cranial cavity was opened, and the great vessels of the chest cut through. The cardiac tissue was apparently healthy, and the valves perfect. The muscular tissue showed, on microscopic examination, signs of incipient so-called "fatty" degeneration. The liver congested; the kidneys highly so. In the pelves of the latter, punctuated ecchymosis was exhibited in its most exquisite form. The larynx was healthy in appearance.

In from one to two hours after removal from the body, the following were separately and successively submitted to chemical examination: six fluid ounces of blood from the cranial cavity; five ounces of the liver; and eleven and a half ounces of the brain. The method made use of was essentially that recommended by Duroy, and differed materially from Ragsky's method employed by Dr. Taylor. The apparatus consisted of a large flat-bottomed flask, in which the blood, or the finely-divided liver or brain-substance made into a pap with water, was placed so as to expose as large a surface as possible. The flask was

furnished with a cork, through which passed two glass tubes—a long one dipping beneath the surface of the liquid in the flask, and a short one passing just through the cork. A caoutchouc air-tight connection was made between this shorter tube and a long hard glass tube loosely-plugged at the nearer end with cotton-wool, and which could be heated by a gas furnace through six or eight inches of its length. To the other end of this tube was fitted a system of Liebig's bulbs, filled to the proper extent with a strong solution of nitrate of silver. The hard glass tube being now heated to redness, and the flask being immersed in water heated to 112° Fahr., air was gently forced through the apparatus—first bubbling through the liquid in the flask, passing thence through the heated tube, and finally being caused to bubble four times through the solution of nitrate of silver. Any chloroform that might have been volatilized in the flask would be decomposed in passing through the heated tube into chlorine, hydrochloric acid, and other products; and the chlorine and hydrochloric acid would be absorbed by the nitrate of silver, giving rise to a white cloud of chloride of silver. Blank experiments were of course first made with the flask charged with liquids known to be free from chloroform; and these yielded negative results.

When the apparatus, charged with blood, had air drawn through it for five or six minutes, a cloudy precipitate of chloride of silver began to form, and in fifteen minutes this was quite obvious. The liver yielded a more abundant and decisive precipitate; and the brain in five minutes a still larger one, beyond which period, owing to a sudden failure in the supply of gas to the laboratory, the experiment was not continued. The precipitates thus obtained were collected, and their chemical properties verified. Their collective weight was the equivalent of one sixtieth of a grain of chloroform.

I have thought this case worthy of being recorded on two accounts. The post-mortem appearances were those of asphyxia in its most exquisite form; and it is the only English case that I know of where chloroform has been detected in the human body after death from the inhalation of that anæsthetic. Dr. Taylor states (*Princ. and Prac. of Med. Jurispr.*, p. 320), that he has failed to detect it in blood drawn from patients during the administration of the drug. He recommends the use of

the method devised by Ragsky ('Journ. f. prak. Chem.,' xlv., p. 170), who states that it is capable of detecting one part of chloroform in a million parts of blood. Duroy subsequently showed ('Journ. de Pharm.,' xx., p. 401) that this process is not to be depended on unless the blood be drawn immediately after the inhalation of the chloroform, or immediately after death; and even then such skilful experimenters as Dr. Taylor have failed in its detection. Duroy was led by his experiments to recommend the process I employed; and it is obviously a preferable one.

My observations lend some weight to the statement of Lallemand (*Dur élede l'alcool et des anesthésiques dans l'organisme*, Paris, 1860) that anæsthetics, and chloroform in particular, are neither transformed nor destroyed in the organism, but remain a long time in the organs and nervous centres, accumulating more especially in the brain and liver. He extracted chloroform in the following proportions from various parts of an animal destroyed by its inhalation :

Blood	.	.	.	.	1.00
Brain	.	.	.	.	3.92
Liver	.	.	.	.	2.08
Cellular and muscular tissue	.	.	.	.	0.16

Dr. Taylor, writing more recently (*loc. cit.*), supposes that where Ragsky's process fails to detect it, chloroform has either completely volatilized, or been changed into formic acid. But as Duroy's method serves for its detection where Ragsky's has failed, and as the change of chloroform in the blood into formic acid is only a supposition, Lallemand's statement may probably be correct.

For notes of this case I am indebted to Mr. W. Cortis.

Poisoning by extract of nux vomica.

John George L—, æt. 12, an errand-boy in a druggist's shop, was admitted into Guy's Hospital under Dr. Fagge, June 9th, 1868. On the morning of his admission he went to the shop at 6.30 a.m., before breakfast. He was seen by the assistant at 7.40 a.m., and was sent downstairs to his work. Whilst there, he states that he picked up a piece of black stuff, about the size of the tip of the finger, and put it into his mouth,

thinking that it was liquorice. Finding the substance to be very bitter he spat it out, or as much of it as he was able. He then finished his occupation of chopping wood, and began to clean some boots. He then felt his legs becoming stiff, and could recollect nothing that occurred subsequently.

The boy's master at first denied that the boy could have had access to any poison, and then admitted that a pot containing extract of *nux vomica* had been left about. He also stated that the boy was found at 7.50 a.m. (another witness said 8.30) extended rigidly along the floor with a boot in his hand. Nothing was administered except a glass of water, and the patient was brought to the hospital shortly before 9 a.m. He was then seen by the house-surgeon, who says that there were slight twitchings of the muscles. He sent the boy into a medical ward, where he was seen by Mr. Stocker a few minutes after nine o'clock. There was then well-marked opisthotonos, the spasms increasing and affecting respiration, which at one time appeared to cease. The face was flushed and anxious; the patient knew when the spasms were coming on, saying, "It's coming on;" and there was a sense of impending death, and he said, "Good-bye, I'm dying." Ice was immediately applied along the spine, and the spasms abated in severity. The jaws were not affected; the boy was quite conscious; the intermissions were distinct; the pupils dilated; the pulse rapid.

9.45 a.m.—Spasms are brought on on touching the patient. Half a drachm of sulphate of zinc was given, and repeated at ten. A pint and a half of warm water was drunk.

10 a.m.—Pulse 138. No rigidity. Spasm is excited by touching him. In no pain, and feels better. Pupils dilated, equal in size, and sensitive to light.

10.30 a.m.—Pulse 120. Respiration eighteen. Pupils natural. Has vomited thrice. The whole of the vomited matters were reserved for analysis.

11 a.m.—Pulse 114. Respiration 18.

11.20 a.m.—The feet were washed, which produced cramp in the muscles of the calf for a few seconds.

11.40 a.m. The patient was removed into a warm bed. The removal produced cramp in both legs for about a minute. He is sleepy, and feels no pain. Ice bags to be still applied to the spine.

12.15 p.m.—Slight twitchings in the face.

12.45 p.m.—Has slept comfortably for half an hour, but awoke with cramp in the leg. Three drachms of castor-oil were given, and he again fell asleep.

1.20 p.m.—The boy awoke feeling quite comfortable, and free from spasms; and indeed he had no return of these. Pulse 106. A quarter of a pint of urine was passed, the first since his admission. It was reserved for analysis. He slept nearly the whole afternoon, taking a little milk occasionally; and at 6 p.m. the ice was removed from the spine. At 7 p.m. vomiting occurred twice; at 8 p.m. the bowels were opened; pulse still 106.

The boy subsequently made a rapid recovery, and was discharged June 11th.

The vomited matters measured fourteen fluid ounces, and presented no remarkable appearances. They were divided into two equal portions, and from these two extracts were prepared by means of dilute acid and alcohol. The extracts were then, after admixture with water, introduced beneath the skin of the back of two frogs. One frog apparently did not experience any ill effects; the other had some slight rigidity after thirteen minutes, and shortly after a feeble rigor: this animal ultimately succumbed without any further signs of strychnia poisoning. Stas's process failed to reveal the presence of either strychnia or brucia in these extracts.

The urine first passed by the patient, five hours after taking the poison, measured five fluid ounces. From this, by a modification of Stas's process for the extraction of the alkaloids, two stains were obtained, one of which yielded the well-known colour test for strychnia, the other that for brucia.

8 grs. of extract of *nux vomica*, which was perhaps about the quantity taken into the mouth, yielded $\frac{1}{10}$ ths gr. of the acetates of the mixed alkaloids, a quantity which would be equivalent to about $\frac{3}{4}$ gr. of the alkaloids themselves.

This case is of interest, as showing for what a length of time, after the administration of *nux vomica*, spasms are excited; and again as showing the importance of an examination of the urine for the alkaloids, even at a period when at first sight it might appear hopeless to attempt their detection.

I am indebted to Mr. Richard Rendle for valuable assistance in reporting this case.

Belladonna Poisoning.

George S—, æt. 2½ years, a well-grown, but strumous-looking child, had been suffering from an abscess in the thigh, and also from an affection of the eye. For the latter disease a lotion consisting of the extract of belladonna dissolved in water was prescribed. One morning, its mother's back being turned, the child seized a cup into which two fluid drachms of the lotion had been poured, and drank off the liquid. It was subsequently ascertained that this quantity of lotion corresponded with exactly five grains of the extract.

The mother immediately administered a teaspoonful of antimonial wine, but no vomiting ensued; and as the child became drowsy, and strange in its manner, it was brought to the hospital, and admitted into the Clinical Ward, under Dr. Rees.

One hour and a quarter after swallowing the poison, an emetic of sulphate of zinc was given. This was speedily followed by the ejection of one fluid ounce of a light coloured fluid, in which undigested pieces of bread were floating, and which had very much the appearance of oatmeal porridge. In this liquid no odour of the extract of belladonna could be detected. It was reserved for chemical analysis.

The symptoms did not differ from those usually observed in cases of poisoning by deadly nightshade. The child's face became flushed and swollen. The sound eye—the one to which the extract had not been applied—was partially, and irregularly dilated; and the child could not recognise those around him, or surrounding objects. At one time he cried out; at another raised himself in bed, fell forward, and tumbled about in a confused manner. The throat and fauces were slightly reddened, there was some difficulty in swallowing, and his voice was hoarse and croupy; though it is at least doubtful whether this last was caused by the poison. There was no rash on the skin. Pulse 180.

Ipecacuanha wine, in drachm doses, was given repeatedly to induce vomiting, and speedily had the desired effect. Castor

oil was afterwards administered. Four hours after taking the lotion, the child was still delirious, with dilated pupils; but he could then recognise the objects around him. He had also twitchings of the muscles, and a great tendency to sleep. Occasionally he started up in his sleep, and fell heavily forwards. Twelve hours after swallowing the poison, it is noted that he had been for some hours sleeping quietly. The pupils were less dilated; and the pulse had fallen from 180 to 120 in the minute. Next morning he was quite conscious, and the pupils were natural. On the succeeding day he had perfectly recovered.

The vomit already spoken of was submitted to analysis, with a view to the detection of atropine, by the well-known process of Stas; care being taken to conduct the necessary evaporations at a temperature not exceeding 170° Fahr., and partly *in vacuo*, in order to avoid any possible decomposition of the alkaloid. No crystalline substance, nor any body having the properties of an alkaloid, was obtained by this means. I am not aware what is the smallest quantity of atropine that has been detected when mixed with the animal fluids; nor do I know of any reliable data from which to calculate the probable amount of alkaloid in five grains of ordinary extract of belladonna; but it must be very small. When we take into account the time that elapsed betwixt swallowing the poison, and the ejection by vomiting of the fluid submitted to analysis, we need not be surprised at the fact that the alkaloid escaped detection. In fact, there is little doubt that in an hour and a half the greater part of the poison would be removed from the stomach by absorption.

Acute alcoholic poisoning.

Joseph S—, æt. 14, was admitted into Clinical Ward, June 9th, 1868, under Dr. Hilton Fagge.

The patient and another boy had been with a cart to Greenwich, to deliver some hampers of wines and spirits. They broke open a hamper, and extracted a reputed quart and a reputed pint bottle of brandy, holding 26 $\frac{3}{4}$, and 13 $\frac{1}{2}$ fluid ounces respectively. These they concealed in the nose-bag of the horse, and drank on their return journey. S— stated that he drank much more than the other, and younger boy; and

thought he must have swallowed a quart ($26\frac{2}{3}$ fluid ounces) without any admixture with water. This occurred at about 2.15 p.m. Directly he had drunk the brandy, the patient felt giddy, but he did not become insensible, and was able to recollect the journey home in the cart. He did not vomit. On their arrival at home, S— was insensible. This was about 4 o'clock, and he was brought to the hospital immediately. His companion, who, it was stated, did not appear to be much affected by the brandy, drove the cart home.

On admission the patient was quite insensible. The surface of the body was rather cold. The breath smelt strongly of spirits. The pupils were neither markedly contracted nor dilated, though they shortly became contracted. There was no stertorous breathing.

The stomach-pump was immediately applied, and the contents of the stomach were drawn off, which had a most powerful odour of brandy. After the operation, the pulse was 80 per minute. He was put to bed and an enema of coffee administered.

At 11 p.m., seven hours after admission, no urine having been passed, this was drawn off by a catheter. The reaction of the secretion was acid, its sp. gr. 1.004, and it was free from albumen. On treating fifteen minims of the urine with a single drop of Dr. Anstie's bichromate test, the fluid gradually assumed a greenish-yellow colour: with two drops of the test, the colour speedily changed to a bright emerald green.

The patient remained unconscious twelve hours—till 4 a.m., when he asked for water.

At noon next day the pulse was 128, the skin hot and dry; the temperature in the axilla 100.4° Fahr. Has much thirst; and fluids are vomited. No headache. He was suffering from a slight attack of pleurisy in the right side. In a few days this subsided, and the patient was discharged well, just a week after his admission.

The quantity of brandy taken in this case, undiluted, and within a very short space of time, was very large. No doubt the boy owed his recovery to the prompt use of the stomach-pump.

The notes of this case were kindly furnished to me by the clinical clerk, Mr. C. E. Wing.

Poisoning by hydrochloric acid.

George S—, æt. 23, was admitted into Accident Ward, under Mr. Hilton, June 19th, 1868.

The patient, after finishing his day's work, went to a cupboard, and filling a wine-glass half full of what he supposed to be brandy, drank it off. The liquid proved to be strong hydrochloric acid, and he at once perceived his mistake. He was brought to the hospital immediately.

On his admission, soon after 9 p.m., the patient was almost asphyxiated. He foamed at the mouth, and could respire only with great difficulty.

The mouth and fauces were so clogged with tough, viscid mucus, which the patient was constantly trying to get rid of, that the state of the tongue and adjacent parts could not be accurately ascertained, though they appeared excoriated. His speech was very thick and indistinct, but with attention he could be understood. He complained of great dryness of the mouth and fauces; and of a severe burning pain in the throat, more particularly in the stomach. The power of deglutition, though necessarily much impaired, was not entirely lost. The pulse was good, and there were no signs of prostration. Vomiting had occurred several times on the way to the hospital. The tongue and mouth did not appear to be much affected by the acid; but he complained of dryness and burning of the fauces and throat. He was put to bed in a semi-recumbent posture, and an ounce or two of olive oil was administered, and then several raw eggs; the former was instantly rejected, but the latter afforded much relief.

R. Tinct. Opii, ℥ xx; Sp. Chloroform, ℥ xxv; Aquæ, ℥j. Fiat haust. statim sum.

Diet.—Beef-tea, milk, and eggs.

During the ensuing night he slept well, and next morning felt relieved. Very slight local signs were visible about the mouth and lips, and these were no longer clogged with mucus. Skin hot, and pulse rapid. He feels very thirsty, with a burning pain in the throat; but can swallow liquids.

Two days later the thirst was much relieved, but he still felt a burning sensation in the throat, though this was less intense

than before. Pulse quiet. The tongue was covered with dead white epithelium about to be shed. He took milk and eggs readily, and that morning had had a very little solid food.

Six days after taking the poison, the pain in the throat had much diminished, and he could take solid food without much inconvenience. The tongue was clearer. Next day he was discharged nearly well.

I am indebted to Mr. A. H. Baines for assistance in reporting this case.

ON INTESTINAL OBSTRUCTION.

By C. HILTON FAGGE, M.D.

HAVING, within the last eighteen months, had in the Clinical Wards cases of intestinal obstruction, and having had opportunities of watching several other cases which have been under the care of my senior colleagues, I have been at some pains to search the Hospital Records for accounts of similar forms of disease; and I have thought that the results of my inquiries might be interesting to others as well as to myself. Our museum now contains accurate reports (with scarce an exception) of all the post-mortem examinations which have been made at the hospital since the beginning of the year 1854. These reports are in the handwritings of the successive demonstrators of morbid anatomy, Dr. Habershon, Dr. Wilks, and Dr. Moxon. Besides the security that is thereby afforded for their perfect accuracy and completeness, they possess the further value that they are entirely unselected.

For the last fifteen years each case has been noted down as it occurred, without reference to its supposed rarity or interest. Hence, the reports of the post-mortem examinations at Guy's Hospital yield pathological information which is for some purposes far more to be relied on than that obtainable by a promiscuous collection of cases published in the Journals and in the Transactions of the Societies. The value of any such collection must always be impaired by the circumstance that the cases themselves are, in fact, selected cases,—chosen on account of their extreme rarity, their unusual

severity, or the striking character of their post-mortem appearances.

During the fifteen years (1854—1868 inclusive) the records of the post-mortem examinations at Guy's contain 54 cases of intestinal obstruction¹ in a total of rather more than 4000 autopsies, yielding an average of about 1·4 *per cent*. This statement may be compared with that made by Dr. Brinton,² who found by an analysis of 12,000 necropsies, that 1 in 280 was the proportion of cases of such a nature. But it must be observed that these numbers do not warrant the conclusion which Dr. Brinton appears to draw from them, that they represent the average mortality from this cause, as compared with that from other diseases. In the first place, it is evident that no hospital statistics can ever be fairly used to determine the relative death-rates from different complaints—at least when an “interesting” disease and an “uninteresting” disease are the subjects of comparison. The “taking-in” physician will always “make a bed” for a case of ileus, while he necessarily sends away many sufferers from consumption or disease of the spine. Again, when death has occurred, the demonstrator of morbid anatomy is sure to have his attention called to a case of intussusception or stricture of the intestine, and such a case will be selected for his demonstrations in preference to one of phthisis or Bright's disease. These statistics, therefore, must be taken for no more than their real value.

Apart from external herniæ, the various forms of intestinal obstruction fall naturally under six heads, which may be enumerated in the following order—taking those first in which the mucous surface of the bowel is affected, and passing gradually to those in which a constricting force acts upon its external surface:

1. *Those in which the gut is plugged by its contents.*—Under this head are included gall-stones, intestinal concretions, masses of ingesta, &c.

2. *Intussusceptions or invaginations.*—In so far as these pro-

¹ It is to be understood that, in accordance with the universal practice of writers on this subject, I exclude all cases of the ordinary forms of hernia, such as come directly under the observation of the surgeon.

² ‘Intestinal Obstruction,’ by William Brinton, M.D., F.R.S. Edited by Thomas Buzzard, M.D. Lond. London, 1867.

duce obstruction of the intestines, they may be regarded as analogous to the agents which are concerned in the first class of cases; the difference is that the bowel is now plugged, not merely by a foreign body, but by another portion of bowel, which is itself sooner or later strangulated by the pressure to which it is subjected.

3. *Strictures*.—In these the disease is seated in the substance of one or more of the coats, and ultimately narrows the calibre of the intestine.

4. *Contractions*.—Under this head I place a large number of cases, often confounded with strictures, but differing from them in some important respects. In these instances the disease begins, not within the intestinal coats, but on their exterior; sometimes on the serous surface of the intestine, sometimes in the mesenteric glands. The obstruction, when it occurs, arises, not merely from a narrowing of the calibre of the bowel, but partly from the adhesion of one coil to another, or to some other structure, or from puckering and contraction of the mesentery.

5. *Volvuli*, including *folds* and *twists* of the intestine.—In these there is no new formation, whether within or without the intestinal coats. The obstruction, or even strangulation, is due simply to the pressure of adjacent portions of the bowel, or its mesentery, or both.

6. *Internal strangulations*, strictly so called, in which the constricting agent has no structural connection with the circumference of the intestine strangulated, but is independent of it, and invested with a distinct peritoneal covering.

Under these six heads we may, I believe, place all the cases of intestinal obstruction that we meet with in practice, or that we find recorded in books.

But it is one thing to classify cases of which the whole history is known, including the report of the autopsy; it is quite another to distinguish such cases at the bedside, when the data are necessarily fewer upon which our conclusions must be based. Let us, for example, take an imaginary case:—A man of thirty is brought into the hospital suffering from “obstruction of the bowels.” On his admission there is entire constipation; he is very sick; he complains of a good deal of pain, perhaps

referred to near the umbilicus; his countenance is anxious; his pulse is quick; the abdomen is considerably distended; on its surface there are seen lines marking out the position of the coils of intestine within. Inquiring into the history of the patient, we perhaps find that he has been ill for four or five days; that his illness had a tolerably definite commencement, although we cannot learn that it began quite suddenly; and, lastly, that if his bowels had previously been sometimes confined, or their action irregular, the constipation was hardly sufficient to arrest his attention. We will go on to suppose that after his admission his condition becomes, day by day, more and more serious; the sickness persists; the vomited matters, which were perhaps at first bilious, become, after a time, stercoraceous; and finally death occurs in about eight or ten days from the commencement of his illness.

A history like that which we have imagined is frequently all that can be learnt in a case of this kind; and the problem may be laid before the physician, to predict from such data what will be the post-mortem appearances.

Now, I think it may be said that if there be no further basis for diagnosis than that afforded in the supposed case, all real diagnosis is impossible, and any prediction that may be made is, in fact, neither more nor less than a guess—a guess which, of course, may turn out happily, but which is no less likely to be upset by the results of the autopsy. There is, perhaps, no one of the known causes of obstruction which might not give rise to such symptoms and to an illness running such a course as are above described.

In endeavouring, therefore, to distinguish clinically the various forms of intestinal obstruction, it must be our main object to supplement the broad facts of the case by careful questioning, by continued observation, and by special investigations; and so to obtain further data which may enable us to determine its pathological nature.

Evidently for such an inquiry a *method* is needed. And practically I believe that it is usual for the physician to ask himself, in the first place, what is the *seat* of the disease; whether it be in the large or in the small intestine. Clinical observers have accordingly devoted much labour to the elucidation of this question, and have laid down certain criteria by

which the different obstructions of the large bowel may be distinguished from those affecting the ileum or the jejunum. These criteria, as generally given, are somewhat as follows :

In obstruction of the small intestine—

1. The pain and other symptoms are more acute, and the course more rapid.

2. Vomiting is early and urgent.

3. The urine is scanty.

4. Distension is early, but not excessive, and affects the small intestine alone.

In obstruction of the large intestine—

1. The pain and other symptoms are less acute, and the course more gradual.

2. Vomiting is long delayed, or of but little severity.

3. The urine is abundant.

4. Distension occurs only after an interval, but reaches an extreme degree, and affects especially the large intestine, so that the transverse colon may be seen crossing the upper part of the abdomen, and there is fulness in one or both loins.

Now, it is quite true that if a number of cases of intestinal obstruction be divided into two groups, comprising those affecting the large and the small intestines respectively, it will be found that the distinctive characters above given are generally maintained. But I nevertheless venture to assert that this result is accidental, and that the criteria in question are in great degree invalid when applied to individual cases.

In proof of this assertion I may cite briefly the main features of two cases which have been under observation in the present year, and of which full details will be given in a subsequent part of this paper.

1. A man suffers from attacks of abdominal pain, in which the coils of intestine can be seen and heard working within the abdomen; he has suffered from these attacks during the four months before his admission, and continues to do so during the month of his residence in the hospital; he has neither nausea nor sickness; his bowels are costive, and he is constantly obliged to take aperients; the abdomen is prominent and rounded, but

the distension is chiefly confined to the lower part of the belly. There is no anxiety of countenance. (See Case 47.)

Here the symptoms were, almost without exception, those regarded as characteristic of obstruction of the large intestine; but the post-mortem examination ultimately showed that the ileum was the seat of the disease.

2. A young woman, previously quite well, is taken ill on October 4th. From that time she retches constantly, and brings up some tea and some brandy which she has swallowed. She is in continual pain. She is admitted on the 7th, and dies on the following day. On her admission she is much collapsed, and has great anxiety of face. She passes only two and a half ounces of urine after that time. Her medical attendant had previously introduced a catheter, but drew off merely a little bloody liquid. The abdomen is enormously distended, tense and hard; it presents a transverse line about midway between the epigastrium and the umbilicus. (See Case 54.)

In this case we find conditions exactly opposed to those in the former one, and (almost without exception) such as are considered to indicate obstruction of the ileum. But on post-mortem examination the part obstructed is found to be the sigmoid flexure.

In each of these two cases there was one feature which pointed in a different direction from the rest of the symptoms, and (as it turned out) in the *right* direction. This was the form of the belly. In the first case distension was limited to the lower part of the abdomen. This might be taken to indicate that the seat of disease was above the large intestine. Such really was the fact; but a reference to two of the cases (Cases 30 and 36) hereafter to be recorded will nevertheless show that the inference just stated is not justified by experience.

On the other hand, in the second case a coil of intestine was marked out upon the surface of the abdomen such as might correspond with the transverse colon. This was thought by some to show that the obstruction was in the large intestine. The fact was so; but in two of the cases which will hereafter be recorded (Cases 56 and 73) I had observed a precisely similar appearance, and had drawn from it this very conclusion, that the transverse colon was distended. Yet in these cases the small intestine was the seat of disease. Hence, in the instance above

referred to I, for my own part, disregarded such considerations, and thought that the ileum was the part affected. In this opinion one of my surgical colleagues coincided, but it proved to be incorrect.

The inference which I wish to draw from these cases is, not that it is impossible to distinguish obstruction of the small from that of the large intestine, but that errors are very likely to be committed if we attempt to make this the cardinal point in our clinical classification of cases of intestinal obstruction. The truth I believe to be that the symptoms and course of the complaint depend far more than is generally supposed on its pathological nature in the individual case; being of one kind, for instance, in a case of stricture (whether of ileum or rectum), and of another kind in a case of strangulation of the bowel (whether of the small intestine and its mesentery by a band, or of the sigmoid flexure by a twist of that bowel on its own axis). But it so happens that strictures of the large intestine are common, those of the small intestine rare; while, conversely, it is the ileum, and not the colon, which is most apt to become strangulated. And thus the distinctions which really correspond rather with the *nature* of the lesion have been associated with its *seat*.

Among the symptoms which have been regarded as belonging to obstruction of the small intestine, there is one, *scantiness* or *suppression of urine*, which it may be well to subject to a somewhat closer scrutiny.

The first observer who drew attention to the value of this symptom as distinguishing different forms of obstruction from one another was the late Dr. Barlow. In a most able paper in the second volume of the second series of the 'Guy's Hospital Reports' this writer contrasted sharply the features presented by two cases, the one of obstruction of the sigmoid flexure, the other of constriction of the jejunum. In the former the urine was abundant, in the latter it was almost entirely suppressed. The suppression observed in the second case was attributed by Dr. Barlow directly to the seat of the disease. When obstruction occurs high up in the small intestines, there is not (he argued) a sufficiently large absorbing surface for the due supply of water to the systemic circulation, and the amount of fluid for excretion is necessarily diminished.

Subsequent writers have not in general disputed the accuracy of Dr. Barlow's facts, although many of them have dissented from the explanation which he gave, and from the chain of reasoning by which he supported it. Thus, Dr. Habershon and others have insisted on the part played by *vomiting* in the chain of events under consideration. As we have seen, when the seat of obstruction is high up, vomiting is early and urgent; and this, these writers remark, must necessarily diminish the amount of fluid to be absorbed by the gastro-intestinal surface. Dr. Brinton has further urged that a large part of the fluid vomited during life, and of that found after death in the intestine above the strangulated point, is actually effused or secreted by the walls of the bowel itself; and that this "constitutes by far the most obvious and simple cause for a diminished secretion of urine, especially when viewed in the light derivable from the analogous diminution seen in Bright's disease and Asiatic cholera, in which we may often notice the same mucous surface acting vicariously to the kidney, on the one hand, as well as depriving it, by a similar process of effusion and expulsion, of the more watery materials which conditionate its function, on the other."

But the relations between the suppression of urine in cholera and that which occurs in intestinal obstruction have recently been brought into a much clearer light by another observer, Mr. Sedgwick.¹ It is well urged by this writer that, if deficiency of fluid in the blood were the cause of the diminution or suppression of the urine under these conditions, the urine which is formed ought to be of high specific gravity and overcharged with solid constituents. To prove that this is not so, he quotes particularly the case recorded by Dr. Barlow himself, in which the jejunum was constricted by a cellular cord. No urine was passed for five days; and on a catheter being introduced, *one ounce, pale and straw coloured, and free from albumen*, was obtained.

Again, if the supposed cause were the real one, we should expect that suppression of the mammary secretion would occur, as well as of the urinary. But there is abundant evidence to

¹ 'On the Nature of Cholera,' 2nd issue, 1866. "On some Analogies of Cholera, in which Suppression of Urine is not accompanied by Symptoms of Uræmic Poisoning," 'Med.-Chir. Trans.,' 1868, li, p. 1.

prove that, in cholera at any rate, the milk continues to be secreted, although no urine is formed. Thus, it appears that the kidneys cease to secrete because in collapse an influence is transmitted by the abdominal sympathetic which paralyses their secreting action. Mr. Sedgwick further shows that the general absence of coma in these cases, although the urine may have been suppressed for several days, can be explained only on the supposition that the urinary constituents cease to be formed. He states that Dr. Garrod has, in fact, ascertained that during the collapse of cholera the quantity of urea in the blood is but small, and that the researches of Dr. Parkes show that there is only a trifling amount of it in the rice-water evacuations. In further corroboration of this view it is said that urea is deficient in the urine first voided while the stage of collapse is passing off.

In his volume on cholera Mr. Sedgwick instanced especially cases of perforating ulcer of the stomach, as agreeing with cholera in being accompanied by great diminution, or even suppression, of the urinary secretion. In his later publications he refers to several other conditions as causes of the same effect. Among them are perforation of the small intestines, obstruction of the small intestines, and poisoning by corrosive sublimate, arsenic, mineral acids, fungi, noxious animal matters,¹ &c.

It appears, then, that a variety of severe affections of the gastro-intestinal canal are capable of producing suppression of urine, apparently by an influence transmitted through the abdominal sympathetic nerve. We should, therefore, expect this symptom to be present in all those among the different forms of intestinal obstruction in which the disease is sudden and severe, so as to give rise to such an influence. Experience seems to show that this is the case. But obstruction of the small intestine is often thus sudden and severe, while that of the large bowel is seldom so; and hence suppression of urine is common in the former, rare in the latter condition.²

¹ So far as I can learn, it has not been observed by surgeons whether the urine is suppressed in cases of strangulated hernia. Mr. Davies-Colley has promised to inquire into this point, and has already informed me of one instance in a woman, who stated that she had passed urine only once in the five days before her admission, during which time she was suffering from a strangulated rupture.

² In making these remarks I do not intend to imply that the urine is never

I have already observed that the different forms of intestinal obstruction which are met with in practice appear to be capable of arrangement under six heads. I will now consider in detail the main features of these varieties of the disease; and I shall base my remarks partly on observations made in the wards of the Hospital, partly on the reports contained in the post-mortem records; supplementing these with a few cases which have come under my notice elsewhere, or which are referred to in the catalogue of the Museum. The cases which I shall quote will be numbered in regular order. Every case which is not contained in the Reports of Inspections at the hospital in the years 1854—1868 inclusive will also have an asterisk affixed to it. Thus, the cases which have no asterisk, being entirely unselected, may be taken as affording a fair basis for the determination of the relative frequency of the more common causes of obstruction of the bowels.

I. GALL-STONES AND INTESTINAL CONTENTS.

It may be taken as a proof of the rarity of obstruction due to causes of this nature, that in no one of the fatal cases recorded in our post-mortem reports during the period I have named was the disease set up by a gall-stone, an intestinal concretion, a mass of fruit-stones, or any substance lodged within its interior. In making this remark I am, of course, excluding those instances in which such a body, lying in the cæcal appendix, or in a diverticulum of the ileum, has led to inflammation and ulceration of the mucous surface, and finally to perforation and fatal peritonitis. These, as is well known, are far from uncommon. But although I have perused the histories of all the cases of this kind which I have met with in searching the Records of Inspections at the Hospital, I have not found any one instance in which total obstruction of the bowels has occurred. Symptoms of peritonitis have been present, but the bowels have acted once or oftener during the illness, particularly when solicited by enemata or by purgatives. Sterco-

scanty in intestinal obstructions, unless the disease is acute and accompanied with collapse. No doubt the cause insisted on by Dr. Habershon—incessant vomiting—is adequate to the production of this effect. We must suppose that it was so in Case 34 (*infra*) in which the disease was a cancer of the cæcum and ileum.

raceous vomiting has not, I think, been mentioned in any one instance. I do not mean, however, to assert that in rare cases inflammation of the cæcal appendix may not give rise to the symptoms of intestinal obstruction. The nearest approach to such an occurrence which I have met with is in certain cases recorded in the 'Transactions of the Pathological Society.'¹ One of these is a case related by Dr. Ogier Ward, of a boy who was taken ill a week after receiving a kick in the right side, and who died after eight days, having suffered from pain and swelling in the right iliac region, constipation, and constant vomiting, at last stercoraceous. In three instances recorded by Dr. Dickinson constipation was among the principal symptoms; one of his patients also had stercoraceous vomiting, but the bowels were opened twice during the progress of the case. Duchaussoy, in his elaborate memoir² on the subject of "internal strangulation," to which I shall often have occasion to refer, discusses this question in some detail; the cases which he gives are less striking than those just cited, but we may, I think, join in the conclusion to which he comes, that "in the great majority of cases the resemblance is not complete between peritonitis from perforation of the appendix and true intestinal obstruction."

But we must return to the subject more directly under discussion.

Although our own post-mortem reports contain (so far as I can find) no record of such an occurrence, it is no very uncommon thing for a gall-stone to become impacted in the small intestine, and to produce fatal obstruction of its calibre. The 'Pathological Transactions' contain reports of at least six cases of this kind. One of these was brought before the society by Mr. E. Pye-Smith, who afterwards presented the specimen to our Museum, where it appears in the catalogue as Prep. 1986⁵⁵.

CASE 1.*—Mrs. S—, æt. 69, very obese, had had good health until three months before her death, when she had, during a fortnight, slight pain in the right hypochondrium and fever, but neither sickness nor constipation. She recovered, but her bowels were believed to have been lately irregular and rather costive. On April 25th she began to feel sick, and vomited bile and gastric fluid in large quantities; the bowels acted freely. There was slight uneasiness in the abdomen,

¹ Vol. vii, p. 211; vol. xv, p. 109.

² 'Mém. de l'Acad. de Méd.,' 1860, xxiv, p. 261.

rather marked in the hepatic region. On the third and fourth days vomiting became more and more frequent and urgent; during these two days she probably vomited a gallon and a quarter of bilious fluid. The bowels did not act at all, but an enema brought away a little pale feces. Urine was still moderately secreted. There was no tympanitis, and little general tenderness of the abdomen. On the fifth day her powers began to fail; the vomited matters were very offensive; she became comatose, and died early on the sixth day.

On post-mortem examination the jejunum was found to be obstructed by a large gall-stone, which lay at a distance of about thirty inches from the pylorus, and could be pushed onwards only by using considerable force. The stone measured four and a half inches in its longer, and two and a half inches in its shorter, circumference. It was of the shape of the gall-bladder. The jejunum above the obstructed point was inflamed and distended. There was an ulcerated communication between the duodenum and the almost absorbed gall-bladder, protected externally by firm fibrinous adhesions.

This case affords an epitome of the symptoms characteristic of this form of intestinal obstruction; if, indeed, it may be said that they are characteristic. The most important features appear to be the sex and age of the patient. The five other patients whose cases are recorded in the 'Path. Trans.' were all women, and their ages 69, 66, 58, 46, 27. Dr. Brinton (who expresses the confident hope that it will henceforth be easy to distinguish this from all other causes of obstruction) further insists on the duration and intensity of the premonitory symptoms, the great pain, the incessant and severe vomiting, the frequent and intermittent attacks which sometimes seem to indicate that the gall-stone is obstructed here and there in its slow passage down the small intestine, and the rapidity with which the last attack sometimes ends in death. One point of considerable importance is that in these cases the gall-stone generally (perhaps always) enters the bowel, *not* through the duct, but by an ulcerated aperture. It is, in fact, too big to make any attempt to pass along the duct, being generally a large calculus formed of cholesterine, such as frequently produces no symptoms at all. Hence, we must not expect in these cases to obtain a history of previous attacks of pain, jaundice, &c.

Besides the cases in which *fatal* obstruction is caused by the presence of a gall-stone in the small intestine, there are others in which a calculus is expelled per anum after more or less severe suffering. In the session 1867—1868, I exhibited at a meeting of the Pathological Society two gall-stones which had been passed in this way. Of these one weighed 400 grains

(besides loss); it measured two and a quarter inches in its long, one and a half in its transverse, diameter. The other weighed 353 grains; it measured two inches in length and one and one fifth in breadth.

CASE 2.*—Mrs. L—, æt. 56, of leuco-phlegmatic temperament and sedentary habits, was attacked with severe sickness, constipation, and distension of the abdomen. Some years before, she had had similar attacks of illness, which had been attributed to gall-stones; and more than once she had had slight jaundice. After seven days the bowels were freely opened, and the calculus was passed with pains like those of labour.

CASE 3.*—A watchmaker, æt. 64 or 65, ran out of his house to stop an apprentice who was running away. He became exceedingly faint, pale, and unable to speak. From this, however, he recovered, and remained pretty well for two or three days, when his bowels became confined. This lasted three or four days, during which time he went frequently to the closet, but could pass only very small quantities of fæces. At the end of the time named he found, on going to stool, that something was protruding from the anus. He had great pain, and sent for Mr. Ebsworth, who removed with a spoon a gall-stone. This patient had long suffered from a pain in the side; from this pain he has ever since been entirely free.

It would be a matter of some interest to ascertain whether in cases which recover, as in the fatal ones, the gall-stone passes into the duodenum, and traverses the whole length of the alimentary canal. I think it is more probable that in cases such as those just described the ulceration leads from the gall-bladder into the colon, rather than into the small intestine. The occurrence of a communication between the colon and the gall-bladder is mentioned in many text-books, but some years ago Dr. Murchison, after making a careful inquiry into the literature of this and similar subjects, failed to find a single instance of such an event, cancerous disease being excepted. A preparation, however, has since been placed in our Museum (Prep. 1959²⁰), which shows that it may occur. It was not determined whether the ulceration had, in that instance, been caused by a gall-stone; but this is very likely, for an angular gall-stone was actually found in the gall-bladder.

It is well known that besides gall-stones, concretions of several different kinds are liable to be found in the intestinal canal, which have been *formed* within its interior. These, however, very rarely of themselves give rise to complete, and scarcely ever to fatal, obstruction of the bowels. I think the only instance of such an occurrence that I have met with is

one recorded in the 'Path. Trans.,'¹ by Dr. Langdon Down, of an idiot boy who after fifteen days' illness died of obstruction, caused by a ball, the size of a hen's egg, made of cocoa-nut fibres, tightly interlaced.

Nor, again, does it appear that masses of undigested food or other ingesta, or of fæcal matters, are ever the sole cause of complete, or at any rate of fatal, constipation. This is a point which is particularly insisted on by M. Duchaussoy, and I have frequently heard Dr. Wilks make the same remark. The French writer just referred to states that he has collected forty-five cases in which obstruction was attributed to such a cause, but that scarcely any of them would bear a close criticism. In almost every instance recovery took place. The parts of the intestine in which fæcal accumulations are most apt to occur are, he says, the cæcum, the sigmoid flexure, and the anal ampulla.

Under this head the following case may, perhaps, be of interest, in spite of the brevity with which it is recorded. I have taken it from the reports of the post-mortem examinations made at the Hospital in the year 1841.

CASE 4.*—E. E—, æt. 40, admitted under the care of Dr. Barlow on August 30th, 1848, and died on October 11th. She suffered from insuperable constipation, and from a tumour in the pelvis. On post-mortem examination both ovaries were involved in a mass of medullary cancer; the rectum contained large scybala, so impacted in the lower part of the tube that they could not be expelled even by forcible means.

I have read of no case in which stoppage of the bowels appeared to be so clearly due to impaction of undigested food as in one related by Dr. Brinton. In this instance a mass of half-chewed filberts seemed to be plainly the cause of symptoms of obstruction, with pain and vomiting. A mass of about the size of a pullet's egg was at first felt in the right hypochondrium. The case looked very like one of intussusception, but the history led Dr. Brinton to conclude that the intestine was suffering from an impaction of its contents. Under the influence of sedatives the mass began to move almost vertically down the belly, and in about two days reached the right iliac fossa, where it was gradually lost to palpation a few hours before

¹ Vol. xviii, 1867, p. 98.

the first relief of the bowels, which announced the patient's recovery.

Dr. Brinton has, however, laid great stress on the fact that, although ingesta rarely by themselves block up the healthy intestines, yet their presence often constitutes an important element in the causation of obstruction in a strictured portion of bowel. He refers specifically to cases in which a mass of salt beef, salad, and even cherry stones, were severally impacted in a narrowed portion of the intestine, and gradually passed through it. M. Duchaussoy also makes a similar statement.

For the sake of completeness, it must be mentioned that recorded cases prove the possibility of obstruction of the small intestine being caused by a sufficient number of specimens of the *ascaris lumbricoides*, twisted and knotted together. Duchaussoy gives nine instances of this kind; and a case in which there were 365 lumbrici is quoted in the 'Edinburgh Medical Journal,'¹ as having been recorded by Dr. Cox, an American physician. It may be noted that in one (and perhaps in two) of the cases cited by Duchaussoy an intussusception also existed, for we shall hereafter see that in several cases in which death has been caused by an intussusception worms have been found in the interior of the bowel.

The general conclusions concerning the forms of intestinal obstruction caused by impaction of contents are that they are very rare, and that the only cases otherwise than exceptional are those in which the obstructing body is a large gall-stone; that the impaction of such a gall-stone hardly ever occurs except in female patients, and usually at an advanced age; that these are the main circumstances which must aid us in diagnosis, but that we may perhaps derive further assistance from the early and intense sickness which has been observed in such cases.

II. INTUSSUSCEPTION.

Probably no kind of intestinal obstruction has excited so much interest as this, which is, indeed, sometimes spoken of as if it were the typical or standard form of the disease. Yet (among hospital patients at any rate) it is decidedly a rare

¹ 1859, p. 168.

affection. For this reason, and because it has recently been treated of in great detail by Dr. Brinton in his valuable posthumous work, I shall pass somewhat cursorily over the subject of intussusception, confining myself as much as possible to the points directly suggested by the cases contained in our Hospital records during the period (from 1854 to 1868) through which I have searched these records. During this period I find seven cases of intussusception.¹ In three of these the seat of the disease was (in part or wholly) the large intestine; in the remaining four the small intestine alone was concerned.

1. *Intussusception of the Rectum.*

In this, as in the other subdivisions of my subject, I shall take the cases I have to record in what may be termed the "reverse" order, and shall begin with those affecting the large intestine. In the following case (which I believe is unique) the *rectum* was almost the only part of the intestine concerned in an intussusception, which protruded from the anus. In part, therefore, it consisted of two layers only; the most external (or "receiving") layer of an ordinary invagination being in a portion of its extent wanting. M. Duchaussoy has expressly referred to this variety of intussusception, but states that he has not found it to give rise to intestinal obstruction. Dr. Brinton remarks that the rectum scarcely ever forms more than the outer layer of an intussusception descending into it from above.

CASE 5.—C. F—, æt. 35, was admitted under Mr. Cock's care on June 18th, 1857, and died on the 28th. She was a single woman. She stated that the bowel had first begun to come down in October, 1856, but that it afterwards returned. The same thing had occurred since, and no doubt had given her much trouble; but from a mistaken modesty she had neglected her complaint, and would give only a slight account of her symptoms. Three weeks before her admission the bowel came down, and she was unable to return it; at the same time there was constipation. She at first sought no advice; and when admitted she was exceedingly ill, suffering from symptoms of strangulation, which, however, were not urgent. The bowels were never relieved from this time until her death. She refused to submit to any operation. The intussuscepted bowel lay for several inches outside the anus; it could be easily replaced within the rectum, but this did not overcome the strangulation.

The post-mortem examination was made by Dr. Wilks. The body was spare.

¹ In this calculation Case 7 is excluded, as the child died out of the hospital.

The abdomen was tympanitic, but not excessively distended. There was acute recent peritonitis. All the intestines were slightly distended; the large bowel considerably so, and filled with fluid fecal matter. Nothing abnormal was seen until the organs within the pelvis were examined. Low down, behind the uterus, an intussusception was found. This seemed so near the anus that at first it appeared like a mere prolapse of the rectum. But after the intestine had been removed it was found that the proximity to the anus arose from the dragging down of the gut; for when the parts were stretched out the lower extremity of the invaginated portion did not reach the anus by three inches. The measurement from the "neck" of the intussusception was nine inches, and the length of the invaginated mass was four and a half inches. It was, therefore, calculated that the commencement of the "entering layer" was eighteen inches from the anus, and consequently that at this point the bowel must belong to the sigmoid flexure. The invaginated mass was sloughing, and (as is usually the case) it was curved on itself by the dragging of its attachment, so that the opening into it was at some distance from its extremity.

2. Ileo-cæcal intussusception.

From 1854 to 1868 (inclusive) we have had in the Hospital three cases of this form of intussusception—so-called by Dr. Brinton. It is that in which the colon receives both the lower part of the ileum and the cæcum, the last-mentioned part of the bowel being generally close to the lower or anal bend of the invaginated mass. One of the three cases referred to has already been recorded by Dr. Hughes in the second volume of this series. I therefore need only give a short abstract of it.

CASE 6.—D. D—, æt. 14, admitted February 27, 1856. Seven weeks before, he had been exposed to great cold, and on the following morning he was seized with severe pain in the abdomen, which lasted for several hours and then ceased, to return the next day. It continued to recur at uncertain periods, sometimes even twice in one day, the longest interval being from the 21st to the 25th of February. He described the pain as a twisting and tearing of his intestines, principally about the umbilicus. During the paroxysm he lay with his legs drawn up, and pressed his hands on the abdomen for relief. He could himself feel lumps in the abdomen, which disappeared when the pain passed off.

No actual tumour seems to have been discovered by examination of the abdomen, but the abdomen was "lumpy and uneven" during the paroxysms. On the 29th a hardness could be felt in the left hypochondrium. Before his admission he had had vomiting after his meals, but this did not return, and for some days he seemed to improve. The bowels were open, and he passed three "lumbrici" on different occasions. From March 10th the pains again became severe. Diarrhœa occurred, and by the 15th this assumed a dysenteric character, the evacuations consisting of bloody mucus without any fecal matter. The rolls of intestine were now clearly visible, and on the 18th it is remarked that one was especially obvious in the left iliac region. There was incessant vomiting of green

bilious fluid. He was again relieved for a time, but ultimately symptoms of perforation of the bowel set in, and he died on March 23rd.

The post-mortem examination showed that there was acute peritonitis, apparently set up by a recent perforation of the sigmoid flexure. The small intestine appeared to terminate abruptly in the transverse colon, a little to the right of the median line; the fact being that part of the ileum and the whole of the cæcum and ascending colon had passed into the interior of the transverse and descending colon. The invaginated intestine was of a blackish green colour, and was considerably ulcerated at its lower extremity. Recent adhesions, barely separable, existed at the upper part, and appeared to indicate the commencement of a throwing off of the intussuscepted part of the bowel.

Before making any remarks on this case, I may pass on to one which has been under my own observation during the past summer, and which resembles it strikingly in many respects.

CASE 7.*—Intussusception. *Pain and abdominal tumour (at first regarded as fecal), the only symptoms for two (!four) months. Correct diagnosis seven days before symptoms of strangulation appeared, including hæmorrhage, and followed by death four days later.*

(The account of the case is taken from the daily reports made by Mr. C. E. WING, my Clinical Clerk.)

W. B—, æt. 5, was brought to me in the out-patient room in the middle of May, 1868, complaining of pain in the abdomen. On examination a tumour was found, occupying the left hypochondriac region, and bent upon itself, so that it had exactly the form that might be presented if the splenic flexure and the adjacent parts of the transverse and descending colon were loaded with fecal matter. I regarded the case as one of fecal tumour, and advised that the boy should be brought into the hospital if the purgative medicines ordered did not remove the swelling.

On July 1st the child was admitted into the Clinical Ward under my care..

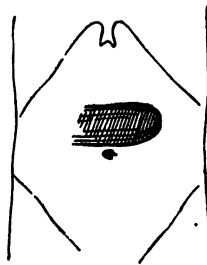


FIG. 1.

The tumour was still plainly to be felt, but was smaller than before, presenting the form shown in the accompanying diagram—a copy of one made at the time.

A history of the case was now obtained for the first time from the boy's mother. "His illness began about the middle of March, when one day he was brought home from school, having been taken during school hours with great pain in the abdomen, so that he rolled about the floor. Three or four days before this he had had pain in the stomach, which was attributed to his having been pinched in the belly by a woman who lived close by, while he had been struggling because he did not want to go to school. His bowels were constipated for four or five days at this time, and he was very sick, bringing up everything that he ate or drank. He also vomited an *ascaris lumbricoides*. He remained ill about a week, and then became better. Since that time, however, he has always suffered from pain in the stomach, which comes on in spasms, making him very restless. His appetite has been very bad. Except at the first commencement of his illness, his bowels have been regular. No blood has ever been observed in his motions."

He is a delicate, strumous-looking boy, and is very thin. His tongue is clean. Pulse 84.

The tumour in the abdomen presents the outline shown in fig. 1. It is cylindrical in form, irregular or lobulated on the surface, and not in the least tender on pressure. It changes its position from time to time, and can be pushed downwards below the umbilicus, or from side to side. There is no decided dullness on percussion over it.

He was ordered Vin. Ferri ʒj ter die.

During the first week after his admission, he had an attack of "stomach-ache" once or twice a day. He referred the pain to the umbilicus. He was very sick on the 8th, but this appeared to be caused by his having eaten a quantity of oranges and other fruit. His tongue remained clean. His bowels were open every other day, the evacuations being natural. The tumour varied greatly. On the 3rd it had "moved more into the left lumbar region." On the 4th it was again "more central." On the 7th "no tumour is felt distinctly now. There is a mass under the ribs on the *right* side, but it is difficult to make out clearly what it is; it might be liver. The right side of the abdomen is fuller than the left." On the 9th "the tumour is as plain as ever this morning in the region of the transverse colon. It disappears to the right side on kneading. There is a crepitating feel as of air over it. It is distinctly nodulated."

In spite of the rarity of a faecal tumour in a child, and of the fact that the bowels were regularly open, I continued to think that the mass consisted of the contents of the intestine. I confess that the idea of an intussusception did not occur to me, nor did it, as I believe, to others who saw the case from time to time. On the 9th July, therefore, I gave three drachms of castor oil. This acted freely, bringing away a quantity of soft faeces. On the following day the tumour was in no wise diminished, but rather larger, "occupying the position of the descending as well as the transverse colon. He had the stomach-ache last night and this morning."

On the 11th my clinical clerk, Mr. Wing, gave the child an enema with a double-acting syringe, for the purpose of determining how large a quantity could be introduced into the bowels; but only half a pint of gruel could be thrown up. The abdomen became so tense, that several of the clinical clerks who were present concurred in thinking it would be unsafe to continue the attempt further. The tube was passed up for fifteen inches. As soon as it was removed the bowels acted freely, a quantity of black faeces being evacuated. After the injection the

tumour could no longer be plainly felt, but a certain degree of fulness was observable in the right lumbar region.

After this the daily report speaks of but little variation in the symptoms. The "stomach-ache" generally returned two or three times each day. The tumour was for the most part plainly to be felt, but on one or two occasions it could not be discovered. We several times noticed that it became harder while under manipulation; so that, although at first not very distinct, it would grow round and prominent while we were examining it.

On the 19th July he was ordered to take Ext. Belladonnæ gr. $\frac{1}{2}$ in a pill three times a day.

On the 21st the report says, "Dr. Fagge since Sunday last has come to the conclusion that the case is one of intussusception." This opinion was first suggested to me by a remark incidentally made by Dr. Wilks, who saw the case with me on the 19th.

During the following night the child suffered a good deal of pain, and in the morning he looked hot and flushed; tongue dry; pulse 86. The tumour now presented the form shown in the accompanying diagram :

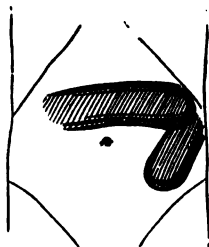


FIG. 2.

The lower part of it seemed to arise from behind the upper part, deeply in the hypochondrium. "The tumour seems to harden under the pressure of the hand. There is no tenderness." From this time all the evacuations were carefully searched for blood, in the hope that its discovery would confirm the diagnosis of intussusception. No blood, however, was found, but some mucus was detected on the 24th.

On the 22nd he had been sick, but the bowels continued to act every day, and on the 26th he was up and running about the ward.

On the 27th, about 1 a.m., he again became sick, and vomited a quantity of greenish fluid. In the course of the day his bowels were much relaxed; the evacuations contained no blood. He looked hot and flushed; pulse 110; tongue dry; skin hot. During the following night he was very restless, had vomiting and purging, and suffered great pain in the abdomen, which caused him to roll from side to side, and at other times to lie on his belly. On the 28th he was ordered a quarter of a grain of morphia by subcutaneous injection. This quickly sent him to sleep.

On July 28th he passed about two tablespoonfuls of blood and mucus together.

From this time his condition rapidly altered for the worse. He was very sick, vomiting, in fact, everything he took, although this consisted chiefly of small quantities of brandy and milk. He passed blood repeatedly, generally into the bed, so that the quantity could not be determined. The restlessness was most distressing; the child kept throwing himself out of bed into his mother's arms, and crying out with the pain. The injections of morphia were frequently repeated, and they always gave him ease and sleep for the time. The abdomen gradually became distended, but did not seem to be tender. The tumour was larger than before; the upper part of it was still in the same position, but the lower part reached lower and formed a large mass, inclining horizontally over towards the right below the umbilicus. It was dull on percussion.

On the 30th of July the mother insisted on taking the child home. He was rapidly passing into a very low state, was constantly being sick, and passing bloody mucus. Pulse very quick and feeble.

The clinical clerks visited the little patient at his home and repeated the injections of morphia. However, he died on the 31st, having suffered comparatively little towards the last.

On the following day a post-mortem examination, at which I was present, was made by Mr. Wing.

The abdomen was a good deal distended. On opening it the appearances presented were generally such as are figured in the accompanying diagram, except that the *size* of the intussusception was less than is represented. The

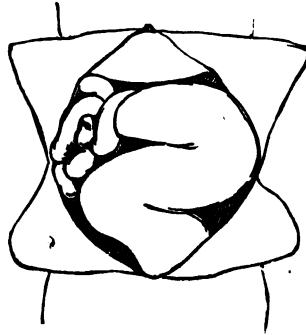


FIG. 3.

viscus lying in the upper angle of the exposed surface is the stomach. Below this is the commencement of the intussusception. The "entering angle" or "neck" of this formed the right edge of the mass which had been felt during life. The ileum passed into it, but its entrance was deeply situated in the abdomen, towards the spine, and therefore cannot be seen in the diagram. The finger could easily be passed into the tumour, along the entering bowel, so that this evidently was not constricted. The tumour formed a double curve, as is shown in the diagram, and terminated in a large rounded mass, close to the brim of the pelvis. The rectum was empty. The small intestines were packed on the right side of the abdomen, and were not greatly distended.

On cutting through the layers of the intussusception, after their removal, the

"receiving" layer was found to be formed by the transverse, descending, and sigmoid colon; the "returning" layer by the ascending and transverse colon; and the "entering" layer by the cæcum and the lower end of the ileum. The contiguous serous surfaces of the entering and returning layers adhered together by shreds of lymph of no very recent formation. The entering layer especially was much swollen and thickened, and of a dark colour, but there was no ulceration nor gangrene. General peritonitis was either absent, or existed only in a very early stage. Plate I, appended to the end of this paper, shows the intussusception as it appeared after its removal from the body.

In many of their features these two cases resemble one another very strikingly, and they afford good examples of the kind of disease to which they belong. Each patient was a boy. Now all writers are agreed as to the much greater frequency of intussusception in the male than in the female sex, whether before or after puberty. Thus MM. Rilliet and Barthez¹ found that among 25 infants, there were 22 boys and only 3 girls; and the proportion given by Dr. Brinton for all ages is $2\frac{1}{3}$ males to 1 female. Then again, the early age of these patients accords with the circumstance that the invagination was of the ileo-cæcal variety. This is in itself the most frequent form, occurring (Dr. Brinton says) in 56 per cent. of all cases indiscriminately; but in early life it is proportionately still more frequent.

It is an interesting question whether the intussusception in my little patient was caused by the woman having "pinched him in the belly" three or four days before the first severe attack of pain occurred. Such a supposition may at first sight appear unlikely, but it is by no means without support from recorded observations. Thus M. Duchapuissoy notes as exciting causes of intussusception the passing of a wheel over the abdomen, a kick from a horse (two cases), violent muscular efforts to raise a burden, and falling upon a seat. MM. Rilliet and Barthez quote the cases of two children in whom invagination occurred suddenly, while they were being jumped in their fathers' arms. They also mention the case of a boy in whom the disease was attributed to a kick in the belly given him by one of his school-fellows.

A further question as to the causation of each of the two cases of intussusception above recorded is whether the disease was in part or wholly set up by the worms (*ascaris lumbricoides*) which were present in the intestine in each patient. It is well

¹ 'Traité clinique et pratique des Maladies des Enfants,' 1861, tome i, p. 806.

known that a polypus growing from the wall of the bowel has in many instances been the starting point of an invagination, having (it would appear) been laid hold of by the walls of the intestine below, in such a way as to drag upon its base, and pull the gut inwards. And it is easy to see that the same thing might occur with a large worm, if its lower extremity should happen to be seized by the vermicular movement of the tube within which it lay, its other end being firmly fixed above. In connexion with this question I may again draw attention to the fact that in one or two of the cases, cited by Duchaussoy, of obstruction caused directly by worms, an intussusception also existed.

When my little patient was admitted into the hospital, the most remarkable symptom which he presented was a tumour in the abdomen, which appeared evidently to be seated in the colon (see figs. 1 and 2, pp. 289, 291). Indeed, this almost seemed to be his only symptom, for the attacks of pain were infrequent and occurred generally at night, and in the intervals the child was apparently well. I at first thought that the tumour must consist of impacted fæces, but in the further progress of the case the regular action of the bowels and the free purgation produced by aperients seemed inconsistent with such an idea. The most remarkable character of the tumour was its variability; its size, form, and exact seat were always changing; sometimes it was scarcely perceptible when the hand was first placed on the abdomen, and would distinctly harden and become prominent under manipulation. I was not aware at the time that M. Duchaussoy has laid great stress on the peculiarities of the tumour in cases of intussusception. This writer quotes from the 'Archives Générales' (1836, p. 240) the account of a case by Dr. John Wood, originally published in No. 30 of the American Journal of the 'Medical Sciences,' in which "when the abdomen was examined, one could at first discover only a fulness and an abnormal resistance in the right iliac region; but if the hand was retained in this position, while an attack of pain occurred, an oblong tumour could be felt, which swelled up as if by a process of erection. At the same time a gurgling sound was heard . . . " Gasté, again (according to Duchaussoy), saw the tumour in his patient increase in size with each new spasm; Nissen felt such a tumour descend; and Phelan observed one which had a *vermicular* movement that was

readily to be recognised. Duchaussoy further insists on the gradual enlargement of the tumour in a definite direction, as more and more of the bowel becomes intussuscepted. With reference to the *seat* of the tumour in the ileo-cæcal form of invagination, it is worth mention that Brinton speaks of such a tumour as being often dragged down in the course of the case, so as to form a short thick mass, parallel with the pubes. But I am not aware that he, or any other writer on the subject (except Duchaussoy), has insisted on the fact that in an intussusception the contractions of the intestine forming the tumour may be felt by the hand placed on the abdomen.

Probably it will to many appear a most extraordinary thing that an intussusception should exist so long as four months, not only without causing obstruction of the bowels, but even before the appearance of sickness, or of those dysenteric symptoms on which so much stress is laid by most writers. Yet this was the case with my patient; and in the little boy under Dr. Hughes' care there was a similar interval of nine weeks. Moreover, the fact is by no means without parallel in recorded cases. In 1864 Dr. Peacock exhibited to the Pathological Society a portion of intestine expelled on the 6th of February by a woman aged 32, whose illness had commenced in the October previous with attacks of vomiting and abdominal pain, recurring at first every three or four weeks, but afterwards gradually at shorter and shorter intervals. The 'Transactions' of the same Society contain an account of another case by Mr. Hutchinson, in which an intussusception was believed to have existed for nearly four months, but in which the final severe symptoms set in only the day before death. This was an example of the ileo-cæcal variety of the disease; and the same has been the case with all the instances of such long duration that I have met with, excepting, indeed, a most extraordinary case recorded by M. Bucquoy,¹ of *triple invagination of the small intestine*, in which the first of three attacks undergone by the patient commenced about ten months before the fatal termination. I do not regard as another exception Dr. Peacock's case, above referred to, because although the part of intestine cast off was supposed to consist merely of ileum, there is nothing to show that the disease was not of the ileo-cæcal variety.

¹ 'Bulletin de la Société Anatomique,' 1853, p. 253

These observations seem to show that the progress of an intussusception may in many cases be divided into two stages. Of these one is characterised by attacks of severe pain, recurring at intervals, between which the patient may appear quite well; by the presence of a tumour; and generally by the absence of marked constipation or even sickness. The other stage seems to be coincident with the occurrence of strangulation in, and with the commencement of the changes which lead to death of, the intussuscepted part of the bowel; it is indicated by the presence of anxiety and constitutional disturbance, by the pain being more or less constant, by the onset of hæmorrhage from the bowels and of "dysenteric" symptoms. Sometimes, indeed, the first stage would seem to be absent, the bowel being strangulated from the moment that intussusception occurs. But it appears to me not unlikely that this stage has often been overlooked in cases in which it had been present; and that it is in reality more frequent than has been supposed.

On the other hand, Dr. Brinton¹ has related a case in which death occurred before this first stage had been passed. A man, æt. 38, was seized three months before his admission into St. Thomas's Hospital with a severe pinching pain in the navel, which doubled him up. From that time he was subject to remittent but gnawing pain, which afterwards became continuous. There was occasional vomiting; his bowels were sometimes purged, rarely somewhat constipated. A long cylindrical tumour, bent into a curve with its concavity upwards, lay across the abdominal cavity. This swelling "was the seat of an active writhing peristalsis." There were marked wasting and cachexia; his complexion acquired a sallow hue. Under the combined influence of opium and belladonna his symptoms were greatly diminished; but he gradually sank, and died six weeks after his admission. The tumour on the abdomen turned out to be an ileo-cæcal intussusception, but he also had diffused cancer of the lungs. "It really remained questionable," says Dr. Brinton in his *Monograph on Intestinal Obstruction*,² "how far the intussusception had directly aided to bring about death."

At the same time, one must not insist too strictly on the

¹ 'Lancet,' 1863, i, p. 409.

² *Op. cit.*, p. 59.

distinction between the symptoms in the two "stages." It might fairly be urged that in each of the severe attacks of pain experienced in the first stage there is, in fact, a commencement of strangulation, although this again subsides. In illustration a case recorded by Mr. Sydney Jones may be quoted from the 'Pathological Transactions.' A child, four months old, was seized with obstruction of the bowels, vomiting, straining, and passing of blood and mucus. At the end of three days these symptoms subsided. After seventeen days they again returned, and again lasted three days. Twenty-four days later still bowel protruded at the anus; and even then seventeen days passed before death occurred (nine weeks from the commencement of the illness). The ileum was found intussuscepted into the colon.

To the fact (as I believe it to be) that such protracted cases of intussusception are almost always of the ileo-cæcal variety I shall again have occasion to refer.

The report of the following case is unfortunately very imperfect. I quote it only because it makes up the number of the cases of intussusception observed at the hospital from 1854 to 1868.

CASE 8.—J. F—, æt. 44, admitted into Philip Ward under Dr. Barlow's care January 4th, 1865, and died January 11th.

On post-mortem examination general peritonitis was found in an early stage. A firm strong band, about one inch long by one-third inch in diameter, passed from the ileum to the middle of the descending colon. It was hard to the touch, and contained visible vessels. At first it seemed to have caused constriction of some coils of intestine, across which it lay. But the splenic flexure of the colon was strangely enlarged, and was found to contain the ascending and transverse colon and the ileum, the bowel above being very much distended.

3. Intussusception of the Small Intestine.

In the remaining three of the fatal cases of intussusception which I have to record, the disease was seated in the small intestine alone. They are as follows:

CASE 9.—J. H—, æt. 16, admitted under Dr. Rees, May 23rd, 1860. He had been ailing for about a year with symptoms of phthisis. On May 22nd he had

been exerting himself, and soon afterwards felt uneasiness in his abdomen. On admission he had a very distressed look, his abdomen was rather tumid and tender on the right side. It was thought that there was probably tubercular disease of the appendix cæci. The symptoms continued, and on the 27th he was exceedingly ill; the bowels had not been opened since his admission; the abdomen was tender and full, but not much distended. It in fact never presented the appearance seen in cases of complete obstruction. An enema brought away a little faecal matter. He gradually sank and died on June 1st.

The autopsy was made by Dr. Wilks. There was recent general peritonitis, the omentum being adherent over the intestines, and these sticking slightly to one another. No one portion of the bowel appeared more dilated than another, all being full of faecal matter. On lifting up the coils one about two feet from the ileum was discovered to be invaginated. While it was being removed, it separated into two parts, the only connection which remained being by the mesentery and the portion included. This was about six inches long, and quite soft and dead. It had also become partially detached from its mesentery, so that it lay in part free within its sheath, with the serous surface exposed. The passage was not obstructed, for the intestine below contained faecal matter, of which a very large quantity also was held in the large intestine. On opening the abdomen it had been noticed that one or two spots in the jejunum looked thin, as if ulcerated on the mucous surface, and that, on pressure, faecal matter exuded. On opening these parts, however, the thinning appeared to be due to distension, the mucous membrane being destroyed transversely round the intestine.

CASE 10.—T. P—, æt. 25, admitted into the Clinical Ward under Dr. Pavy's care, June 28th, 1866. He had been taken ill four hours before. He died on the 30th.

The post-mortem examination was made by Dr. Moxon. Externally the abdomen was perhaps rather puffed up, but not much so. Its walls were tense. The peritoneum was acutely inflamed, a strong line of injection running along the "suction spaces," but there was scarcely any lymph. On opening the abdomen nothing was seen but small intestine, with the exception of a small part of the edge of the liver, and a little omentum. The coils were considerably, but not enormously, distended. On raising the lower coils, a portion of bowel of a deep-red colour was seen. This formed an intussusception, five inches long (external measurement), situated at a distance of two and a half feet from the end of the ileum. When the receiving layer was opened, the mucous membrane of the returning layer was seen to be black and reddened, coated with a thin, pale, lymph-like material, and with some blood on it. The intussuscepted part of the bowel was twisted to one side by its mesentery. Between the returning and entering part were some sanguineous liquid, and a clot somewhat adherent to the (serous) surface. The returning part was thickened. The entering part quite empty.

Above the constriction the mucous membrane of the intestine was cedematous. Immediately below the intussusception the ileum contained a bloody grumous fluid. In the cæcum and ascending colon also there was glutinous black blood in some quantity attached to the parietes.

The tumour lay in front of, and a little above, the promontory of the sacrum.

CASE 11.—J. S., æt. 17, admitted under Dr. Barlow's care into Philip Ward September 17th, 1857, with fæcal vomiting and symptoms of peritonitis; he died in an hour or two. His illness had begun two weeks before, when on going to stool he found that nothing passed his bowels. Since then there had been insuperable constipation, vomiting, increasing distension of abdomen, &c.

On post-mortem examination (which was made by Dr. Wilks) there was early peritonitis. The obstruction was at once seen to be an intussusception of the lower part of the ileum, three feet from the cæcum. The intestine had passed for four or five inches into the part of the bowel below it. The contained part was sloughing and hanging in shreds, and appeared as if it would shortly have been detached. There were firm adhesions between the two opposed serous surfaces of the intussusception, and lymph lay between them, so that the calibre of the inner layer was much narrowed, only admitting a probe. Just above the intussusception the bowel had sloughed and had separated entirely from it, allowing its contents to escape into the peritoneal cavity. There was not very much extravasation, however, so that the aperture must have been closed by being in contact with an adjacent coil. The small intestines and stomach were distended and filled with fluid fæcal matter, not distinguishable in appearance or odour from that in the large gut, which was rather contracted.

CASE 12.—The remaining case of intussusception of the small intestine is that of a girl, æt. 16, who died in Martha Ward under Mr. Birkett's care in the year 1867. As this case has already been recorded in the last volume of the 'Reports,' I do not think it necessary to repeat the details in the present paper.

The three forms of intussusception to which the above eight cases belong, are not the only ones mentioned by writers. It sometimes happens that the small intestine is invaginated through the ileo-cæcal valve, a variety which, although it has been confounded with the "ileo-cæcal," is essentially distinct from it. It is very rare, and M. Duchaussoy could discover only four examples of it, one of which is a case recorded in the 'Path. Trans.' by Dr. Hare. According to Duchaussoy, this variety differs from the other forms of intussusception in the rapidity and completeness of the strangulation of the intestine, a consequence of the *muscularity* of the "neck" which constricts it. Dr. Ballard, however, recently exhibited to the Pathological Society¹ a case of this kind, of which the total duration was seventeen days, and which lasted twelve days after the dysenteric symptoms had commenced. The ileum was found to project in an elongated nipple within the cæcum for about one inch and a half.

Another form of intussusception, not so very infrequent, is that in which one part of the large intestine is received into

¹ 'Pathological Transactions,' xviii, 1867, p. 92.

another part of the same bowel. This is the "colic" variety of Brinton. I find no instance of it in our records.

Practically, therefore, the forms of invagination between which we have to distinguish are two; the "ileo-cæcal," and that affecting the small intestine alone.

Now there are among writers some rather considerable discrepancies in regard to certain points in the differential characters of these two forms, and particularly as to the date at which the intestine is cast off, and as to the duration of life, in the ileo-cæcal variety and in that affecting the small intestine respectively. Dr. Brinton states that the average duration of the cases directly fatal is about the same in the two varieties (five days and a half); but that the separation and the expulsion of the invaginated segments take place, on the average, on the fifteenth and twenty-second days respectively in the ileo-cæcal form; on the eighth and the tenth days respectively in that affecting the small intestine. M. Bucquoy, on the other hand, is quoted by Dr. Peacock as having remarked that when the disease occurs in the small intestine, it is usually less rapid and intense than when affecting the large intestine, and consequently allows a longer time for the separation of the invaginated portion. Dr. Peacock unfortunately does not give any reference to the source from whence he obtained M. Bucquoy's views. I have, therefore, been unable to ascertain on what facts his conclusions are based. His case of *triple invagination of the small intestine* above referred to was certainly of very long duration, and we may perhaps fairly conclude that it influenced him in forming the opinion attributed to him by Dr. Peacock. This case, however, was undoubtedly one of a most exceptional kind.

The explanation of these difficulties I believe to be in the fact (insisted on by Dr. Brinton and others) that in an "intussusception" the bowel may be simply *invaginated*, or it may be *strangulated* as well. Now when the small intestine alone is the part affected, the one condition usually follows close upon the other. So far as my reading goes (with the single exception of M. Bucquoy's case above cited), I have found that intussusception of the small intestine takes a pretty uniform course; the symptoms steadily develop themselves; and the case terminates one way or the other within a tolerably definite period.

But, as we have already seen, the course of an ileo-cæcal intussusception varies greatly in different cases. Sometimes weeks or even months may elapse before serious symptoms show themselves; sometimes strangulation occurs at the first onset, and death within three or four days.

It would seem, then, that Dr. Brinton's statistical results contain a fallacy dependent on the want of uniformity in the cases of the ileo-cæcal variety on which they are based. They are only averages, and appear to have been reckoned from the commencement of the patient's illness in each instance. It is clear that the introduction of one or two such cases, as Cases 6 and 7 recorded in this paper, would immensely increase the average duration of life in the ileo-cæcal form of the disease, and in the same proportion the length of time occupied before the separation of the sloughing bowel.

It would be quite in accordance with the results of observation in other forms of acute strangulation of the large intestine, that the duration of an ileo-cæcal intussusception, *reckoned from the onset of strangulation*, should be more rapid than that of an intussusception of the ileum. This would coincide with M. Bucquoy's opinion, rather than with Dr. Brinton's.

The following appear to be the differential characters which will most assist us in distinguishing ileo-cæcal intussusception from that of the small intestine.

1. In the ileo-cæcal form, the tumour appears in some part of the course of the colon, and finally descends into the left iliac fossa, or occupies the supra-pubic region; at a late period in the case it may be felt per rectum, or even protrude at the anus. When the small intestine is the seat of the disease, the tumour (if any) is to the right of the umbilicus, and smaller.

2. Tenesmus, straining, and passing of bloody mucus, occur mainly in the ileo-cæcal variety, and in that in which the colon alone is affected; but large hæmorrhage *may* be met with in this variety, and in infants is often the first symptom. In intussusception of the small intestine the quantity of blood passed is frequently large, and some may be vomited.

3. Those cases in which there are violent attacks of pain for weeks or months before other symptoms set in belong almost invariably to the ileo-cæcal variety; and, generally, all those in

which the symptoms subside again and again, leaving the patient well in the interval. On the other hand, when all the symptoms are fully developed, the fact that a case terminates within three or four days from the onset of such symptoms is probably in favour of its being one of ileo-cæcal intussusception; while in those cases in which the symptoms gradually increase during a period of eight or ten days, the affection is generally of the small intestine. It is in these cases especially, that there is a fair hope that the part affected may be thrown off, and that a cure may result.

The museum contains several specimens of portions of bowel cast off after intussusception. One of these was some years ago placed in my hands for examination by Dr. Wilks. It came from a child, one year old, who was under the care of Dr. Heginbotham of Bruton, and who had passed blood. The child recovered. I found the specimen to consist of 12 inches of the intestine, of which less than an inch was small intestine, the remainder being cæcum and ascending colon. It formed a single tube and was turned completely inside out, the appendix cæci lying within its calibre, and opening directly on its outer or mucous surface. This would of course correspond with the characters of the entering layer of an invagination; and we must suppose either that the returning layer was cast off separately (perhaps in shreds, as often happens), or that it had become turned inside out during the process of detachment, or during that of expulsion. According to Dr. Brinton, experience shows that either may occur; but I do not see very clearly how this is to be established, as almost all cases must present the two alternatives, and there must be the same difficulty in deciding between them, in every case, as in the one just referred to.

III. STRICTURES.

Under this head I propose to consider those cases in which intestinal obstruction is due to a growth interstitial to the walls of the intestine, or affecting its mucous surface and projecting into its interior. I have thought it desirable to place in a sepa-

rate group certain other cases, not infrequent, in which the exterior of the bowel is primarily attacked, and the proper intestinal coats are only secondarily affected. In almost all of the latter group of cases, the disease is not limited to a special part of the intestinal tube, but invades, simultaneously, two or more adjacent coils. In this respect, therefore, it differs from *stricture*, in the ordinary sense of that term. I propose to speak of such cases under the title of "contractions."

From Jan. 1854 to Nov. 1868,—the period during which the facts have been accumulating, on which this paper is based,—I find reports of 17 cases in which fatal obstruction of the bowels was due to strictures. In addition to these, I may quote five cases of a similar kind from our records previous to the commencement of the present system of registering the post-mortem examinations at the Hospital.

In these 22 cases, the seat is stated to have been as follows :—

In the rectum	6 times.
In the sigmoid flexure.....	6 "
In the descending colon	3 "
In the splenic flexure of the colon.....	3 "
In the hepatic flexure of the colon.....	1 "
In the ascending colon	1 "
In the cæcum	1 "
In the cæcum and the ileum	1 "

—
22

In no single instance, during this period, was fatal obstruction caused by a stricture situated entirely in the small intestine.

It will not be necessary for me to give minute details of these cases, which in their main features resemble one another pretty closely. I shall, therefore, for the most part confine myself to a recital of their pathological characters.

Rectum.—CASE 13*.—M. S—, æt. 36, admitted under Dr. Barlow's care, May 29th, 1847, and died on June 5th. The rectum was strictured just at its commencement; a flexible tube introduced into the anus could not be passed into the intestine above. After removal, water escaped very slowly through the stricture. The blade of the enterotome, however, traversed it easily. The peritoneum was corrugated over the diseased part, and the *appendices epiploicæ* were drawn closely together. The wall of the gut was rather thickened, particularly the mus-

cular tunic; and the mucous membrane, both above and below the constriction, formed fungous-looking masses, which seemed to have acted as valves, preventing the passage of the contents of the bowel. The lymphatic glands and organs generally were unaffected.

CASE 14.*—H. C—, æt. 23, admitted under the care of Dr. Hughes, January 26th, 1849. The colon was opened in the left loin. He died on March 3rd.

The obstruction was found in the first third of the rectum, and seems to have been of a cancerous nature. Cancerous deposits existed in the lungs and in the liver; and very abundantly in the subperitoneal tissue of the abdomen generally. There was an ulcer penetrating the walls of the cæcum.

CASE 15.*—S. J—, æt. 28, admitted under Dr. Hughes' care August 2nd, 1849, and died on August 5th. The rectum contained an annular growth, at a distance of about four inches from the anus. The mass was about one and a half inch broad and projected into the bowel, so as to leave a kind of valvular opening. It was an epithelial growth, with slight induration and corrugation of the sub-mucous cellular tissue.

CASE 16.—R. C—, æt. 32, admitted under Dr. Gull's care, July 2nd, 1854. The abdomen was enormously distended. This was due to enlargement of the colon, the small intestine being but slightly larger than natural. The transverse colon was bent upon itself, and the sigmoid flexure made a double curve. Their walls were considerably hypertrophied. Just within the hollow of the sacrum was the disease, which occupied four inches of the canal, and consisted of epithelial cancer. The interior of the gut was ulcerated, and presented a few vascular fringes. It readily admitted an enterotome.

CASE 17.—M. P—, æt. 48, admitted under Mr. Bryant's care October 5th, 1859. Colotomy was performed. She died on October 19th. The stricture was situated four inches from the anus; it was caused by the contraction of an ulcer, surrounded by a raised vascular edge of mucous and submucous tissue. The whole disease was about of the size of a crown-piece, but was of an oval shape, and included the whole calibre of the gut. There was neither ulceration nor disease at any other part of the bowel.

CASE 18.—J. F—, æt. 50, admitted into the Clinical Ward under Dr. Rees' care, October 17th, 1866.

It was known that the patient had cancer of the rectum; nothing had passed through his bowels for weeks.

The post-mortem examination was made by Dr. Moxon. On opening the abdomen the large intestine was seen to be enormously distended. The cæcum, transverse colon, and sigmoid flexure appeared especially prominent; the transverse colon was bent downwards on itself at an angle. The small intestines were also much distended. The walls of the colon, when it had been laid open, were eight and a half inches wide. Its coats were very thick, its muscular fibres (both circular and longitudinal) being hypertrophied. There was no ulceration of its mucous surface: the contents were liquid.

The distension ceased abruptly at the rectum, about its upper third. The affected part was fixed tightly to the sacrum, and very little movement of the sigmoid flexure sufficed to tear the bowel above the stricture, and to cause an escape of fæces. The disease consisted of a cancerous ulcer, with fungoid margins yielding a moderate quantity of cancerous juice on scraping. The liver con-

tained many cancerous nodules. There was no lymph on the surface of the intestines, but the "suction lines" along them were highly reddened. Dr. Moxon remarks that he does not think this a proof of inflammation, when the distension is so great as it was in the case under consideration. [On physical principles the gut, when over-distended, would necessarily assume as nearly as possible a perfectly cylindrical form, and this would produce an action of *suction* along the lines where the neighbouring surfaces meet one another and the adjacent peritoneum.]

Sigmoid flexure.—CASE 19.—R. G—, *æt.* 44, admitted under Dr. Habershon's care, July 2nd, 1854, and died on July 8th.

The post-mortem examination was made by Dr. Wilks. The peritoneum was very injected, and covered with lymph. All the intestines were much distended, down to the sigmoid flexure. This was suddenly narrowed just where it joined the rectum, in front of the promontory of the sacrum. When the bowel had been removed, water placed in it would hardly pass through, and a probe would only just enter the stricture. The disease occupied about an inch in length of the bowel. Its surface was flocculent, and it was found by Dr. Wilks to be made up of vascular villi, covered with columnar epithelium. The gall-bladder contained four or five cancerous masses,—one as large as a walnut.

CASE 20.—J. M—, *æt.* 72, admitted under Mr. Cock's care, January 26th, 1865.

On post-mortem examination a cancerous mass, about the size of the palm of the hand, was found in the sigmoid flexure, at a point which, when the parts were removed, was a foot and a half above the anus. The mass was ulcerated on its inner surface, and a finger could be passed through it. Probably, therefore, the obstruction was in part due to the twist made by the diseased part, and to its adhesion to the vertebræ, and to an adjoining coil. The intestines above were distended, especially the cæcum and colon. There was general peritonitis. There was no cancer of any other organ.

CASE 21.—E. H—, *æt.* 53, admitted under Dr. Hughes' care, November 7th, 1855, and died January 8th, 1856.

On post-mortem examination the abdomen was very much distended, and peritonitis existed in its earliest stage. The large intestine occupied the greater part of the peritoneal cavity. The transverse colon was bent down towards the pelvis, so that the large bowel formed four parallel vertical columns. The seat of stricture was over the left sacro-iliac synchondrosis, at the junction of the colon and rectum. The diseased part was firmly adherent by thickening of the peritoneum and subperitoneal cellular tissue. The other coats were also thickened, but the stricture seemed to be due principally to a simple contraction. When the internal surface of the diseased part was looked down on through the colon, it appeared to be almost perfectly closed; but with a little force the blade of the enterotome was made to pass through it. The coats of the intestine, as before said, were seen to be thickened and indurated by the formation and contraction of fibrous tissue, and on the mucous surface there projected several rounded red vascular nodules of soft mucous membrane.

The intestines above were very full of fluid, but presented no disease, except an ulcerated patch in the lower part of the ileum.

CASE 22.—S. O—, *æt.* 42, admitted into Mary Ward under Dr. Hughes' care, November 18th, 1856, and died on the following morning.

On opening the abdomen a large gush of air took place; and a great quantity of fecal matter was found spread over the intestines. There was early peritonitis. The whole of the large intestine was immensely distended, but especially the cæcum and the commencement of the ascending colon, which were the most prominent parts when the body was opened. The small intestines were distended, but slightly more than natural, so that the ileo-cæcal valve would seem to have acted very completely. Seventeen inches above the anus the distension of the descending colon suddenly ceased. Here there was a mass of disease, one and a half inch in width, occupying equally all sides of the bowel. It was such as is ordinarily termed villous cancer, and was made up of a white soft substance having a red, highly vascular surface. The upper and lower borders were well defined; they projected inwards towards the centre of the bowel, and so closed it that only the tip of the little finger could enter. Immediately above the disease was a minute perforation of the intestine, which, however, had been closed by the adhesion of a coil of ileum and of the left ovary to its outer surface. All the coats of the bowel near the diseased part were much thickened. The rectum contained a small quantity of dry feculent matter, but not the slightest fluid; so that the obstruction during life had evidently been complete.

The mucous surfaces of the descending and the transverse colon were healthy, but the coats of the ascending colon, cæcum, and ileum had undergone great thinning and destruction from ulceration, the mucous membrane of the cæcum in particular presenting large patches of ulceration, one as big as the palm of the hand. At a spot in this perforation had occurred, and the extravasation from it had been the immediate cause of death. The large intestine still contained several pints of fluid.

CASE 23.—J. F—, æt. 65, admitted into Luke Ward under Mr. Hilton's care, March 29th, 1868. He died on April 6th.

The report of the post-mortem examination is taken from that made by Dr. Moxon.

The peritoneal cavity contained some two pints of clear dark yellow fluid. The peritoneum itself was studded over with cancerous tubercles. These were very abundant on the mesentery and omentum, but the small intestines and descending colon were nearly free from them. The cause of the symptoms of obstruction of the bowels was a mass of disease in the sigmoid flexure, just above the pelvis. Here the bowel presented a puckered patch of about an inch in length. It was quite free from adhesions to surrounding parts. The blade of the enterotome would just pass through it. The mucous surface showed a cancerous ulcer, with an excavated centre and abrupt raised vascular edges. Above the constriction the bowel, when opened, measured seven inches transversely, and its cut edge was twice as thick as one's thumb-nail, owing to hypertrophy of its muscular coat.

CASE 24.—W. S—, æt. 57, admitted into Stephen Ward under Dr. Habershon's care, July 21st, 1868, and died on July 25th. The result of the post-mortem examination was recorded by Mr. Howse.

On opening the abdomen a sudden ejection of flatus and feces took place. These had been in the cavity of the peritoneum, and a thick layer of fecal matter (similar to that usually found low down in the small intestine) was found covering all the viscera, and passing into the intervals between the coils of intes-

tine, upon which it had moulded itself,—thus presenting an appearance very different from that seen when the bowel has been accidentally punctured in making the autopsy. The much distended small intestine occupied the whole centre of the abdominal cavity. The stomach, spleen and liver were quite invisible, being pushed upwards under the ribs, and the diaphragm was much more arched than is natural.

The cæcum, ascending colon, and transverse colon occupied their natural positions, and were enormously distended with fæces. At the splenic flexure the bowel was so enlarged as to have the size and form of a distended stomach rather than anything else. Immediately below this it was gangrenous, and had ruptured. Farther down it again became distended. All the coils of intestine were adherent by soft and very recent lymph. On removing the intestines a stricture was found at a distance of about eight inches from the anus, and consequently at about the junction of the rectum and sigmoid flexure. It was formed by a growth involving the whole calibre of the gut, and was about an inch and a half in length. An instrument about half an inch broad and a quarter of an inch thick could be passed through it. The growth was vascular and very soft, and yielded a slight juice on scraping the cut surface. Microscopically it consisted entirely of aggregated cylindrical epithelium-cells. In the centre of the stricture the growth was breaking down, so that a probe could be passed into the peritoneal cavity from the interior of the bowel. On each of the serous and mucous surfaces there were two projecting earth-worm-like lobules. It is probable that one of these on the interior had acted like a valve, and so produced the complete obstruction which had existed.

On the surface of the liver there were seen two or three branching lines, evidently terminal branches of the portal veins. They had thickened walls. On pressing the vein with the edge of a knife a quantity of juice exuded, which lay within the cavity of the vein, for it could be pressed backwards and forwards in its interior. When examined microscopically it was found to consist of cylindrical epithelium-cells, exactly like those which made up the growth in the bowel. The walls of the little veins were themselves white and thickened. The surface of the liver also presented a few white spots, the most of them very small, but one one third of an inch in diameter. The structure of these consisted of liver-cells, very imperfectly formed, as if tending to the production of cancer-cells.

Descending colon.—CASE 25.—J. W—, æt. 30, admitted into Mary Ward under Dr. Gull, June 14th, 1859. She died on August 21st.

The post-mortem examination was made by Dr. Wilks.

The colon was extensively diseased, principally in its descending part. This contained a large cancerous ulcer, as big as the palm of the hand, with thick, raised cancerous edges. Below this the sigmoid flexure was healthy; but above it the colon was very much ulcerated, nearly half the mucous membrane being destroyed, and its coats being very much thinned—a change which appeared to be the result of distension. The abdominal walls and the omentum were firmly adherent to the left side of the large intestine, but at one point an adhesion had given way, and extravasation had occurred, which had set up a general peritonitis. The colon was so thin at other parts that several holes were made in removing it. The intestines above were distended, as well as inflamed.

CASE 26.—J. L. La F—, æt. 40, admitted into Petersham Ward under Mr. Fors-

ter's care, May 2nd, 1866, with symptoms of strangulated intestine. There was a nodule close to the umbilicus and just above it, to which (it was thought) the symptoms might perhaps be attributable; but no operation was considered to be justifiable. The patient died on May 17th.

The post-mortem examination was made by Dr. Moxon.

The little tumour above mentioned was found to be a ligamentous nodule the size of a filbert, connected with the umbilicus. There was acute peritonitis. The small intestine was much distended, especially below the jejunum, and its coats hypertrophied. The colon was also distended. At a point just above the crest of the ileum the descending colon was rather closely constricted by an ulcer-cicatrix. Below this point the mucous membrane was healthy, but above it severe ulceration existed, which ceased abruptly at the seat of stricture. The ulcers had reached the muscular coat, and five of them had opened the bowel by sloughy ulceration; the gap being stopped by neighbouring coils of the ileum, so that on removing them fecal extravasation occurred. The ulcers tended to run transversely. The muscular coat of this part of the bowel was thick, but contained no new growth of any kind.

CASE 27.—T. J. E—, æt. 53, was admitted into Clinical Ward under Dr. Pavy, September 16th, 1868. He died on September 18th.

The post-mortem examination was made by Dr. Dickson in Dr. Moxon's absence. The descending colon about four or six inches above the sigmoid flexure was constricted by a cancerous mass, which during life had been felt as a hard mass in the lumbar region, just above the crista ili. About an inch and a half of the gut was involved. The constriction allowed the index finger to pass through it, but with some difficulty. The disease appeared to be epithelioma. It had nearly ulcerated through the bowel on its posterior aspect, so that its wall broke down as soon as a stream of water was allowed to run upon it. The small intestines were distended, as were also the colon above the stricture, and especially the cæcum.

Splenic flexure.—CASE 28.—M. B—, æt. 33, a patient of Dr. Barlow's. She was admitted on May 26th, and died on June 12th.

At the junction of the transverse with the descending colon there was a stricture. Immediately above this was a large ulcerated opening in the thickened and dilated bowel. The cæcum also contained numerous perforations, and through all these fæces had escaped; ulcers were also present in the small intestines.

CASE 29.—C. L—, æt. 35, admitted under Dr. Rees' care April 14th, 1868, and died on April 16th.

The following account of the post-mortem examination is condensed from Dr. Moxon's report. There was a little recent peritonitis over that part of the abdominal cavity which surrounds the cæcum. The whole alimentary canal was much distended with greenish-yellow semiliquid fæces as far as the splenic flexure of the colon; below this, the bowel contained only a few scybalous masses and gas. The size of the cæcum was enormous; it was as large as the calf of one's leg. In it were two or three small circumscribed sloughing points.

The obstruction, when seen from without, appeared exactly like a simple ligature of the bowel. It was not half an inch wide, and there was no appearance of inflammatory or other formation on the outer surface. The blade of the enterotome passed easily through it, although the obstruction had during life been

complete. A section of the stricture showed a bending in of the whole bowel, resembling (for instance) an hour-glass contraction of the stomach. The mucous surface was entire, and the submucous tissue was moveable on the hardened opaque muscular coat, which was one tenth of an inch thick. The subperitoneal tissue was also thickened. It was thought by Dr. Moxon that a portion of the colon, one and three quarters of an inch in length, had been engaged in this inward bend, and that the quantity of tissue was not greater than would correspond to that length of the bowel, if condensed. On further examination it was found that there was a tumour the size of a hazel-nut in the wall of the gut on *one side* only. Even here there was no independent growth, but all the coats (except that containing the follicles of Lieberkühn) were uniformly swollen out, "as if from a centralised action of growth in all the tissues of the affected spot." The meshes of the submucous coat contained clusters of proliferating cells.

CASE 30.—E. B—, æt. 61, admitted under Dr. Wilks' care into Stephen Ward, September 26th, 1868, and died on October 16th.

At the post-mortem examination it is especially noted that the abdomen was flaccid. The large intestine was dilated and very much thickened, especially towards the splenic flexure. Close to this there was a considerable cancerous mass, through which the finger could just be passed. The cancer was epithelial and ulcerating. It involved a considerable length of the intestine, several appendices epiploicæ being drawn into the contraction caused by it. The bowel was not completely obstructed, but contained feces below as well as above the seat of stricture. The liver contained one small cancerous mass.

Hepatic flexure.—CASE 31.*—G. P—, æt. 58, admitted February 16th, and died on February 21st, 1853.

On post-mortem examination there was general peritonitis. The alimentary canal was greatly distended as far as the hepatic flexure of the colon, where the bowel was constricted, as if a band had been tied round it. The transverse colon contained a little flatus and some scybala; the rest of the bowel was highly contracted on a few scybala. At the seat of stricture the peritoneum, cellular tissue and fat, and the proper tunics of the bowel had all contracted together. In the interior was a vascular mass projecting on both sides beyond the constriction, but especially to the rectal side. It was developed on the mucous membrane, and projected into the interior of the bowel like a great wart. It, however, involved the anterior band of longitudinal muscular fibres. It was such as would have been termed "villous cancer" by Rokitsansky and others. Above the seat of constriction the muscular fibres of the bowel were hypertrophied. The ileo-cæcal valve was thickened, its borders ulcerated, and it was in such a state as to allow regurgitation through its orifice. A few small tubercles, regarded as cancerous, existed in the omentum, but the liver contained no cancer. Water from the pipe would not pass the constriction in the colon after its removal, but a probe or grooved director traversed it readily.

(This case has been recorded by Mr. Birkett in the 'Transactions of the Pathological Society,' vol. iv, p. 154.)

Ascending colon.—CASE 32.—W. C—, æt. 27, admitted under Mr. Durham's care August 22nd, 1864. Colotomy was performed in the right loin. He died seven days afterwards.

The post-mortem examination was made by Dr. Wilks. The contiguous por-

tions of the intestines were highly vascular, as if from early peritonitis. The seat of disease was the ascending colon, immediately beyond the part opened in the operation. Here there was a large villous growth projecting into the interior of the bowel. It grew round the whole calibre of the gut, but was principally composed of two masses, each of the size of a small egg. These were somewhat pedunculated; when placed under water, the surface was seen to be very shaggy and vascular. The microscope showed the surface to be composed of villi, with looped blood-vessels. The ileum was greatly distended, and much hypertrophied. The colon beyond the cancerous mass was contracted, but contained hardened scybala, which had perhaps formed a tumour which had been felt during life in the position of the transverse colon, and had given rise to some difficulty in the diagnosis of the case.

Cæcum.—Of the following cases I give detailed reports, partly because they were both watched by myself, partly because of the rarity of disease in this part of the bowel :

Cancer of cæcum.—CASE 33. (From the report of Mr. C. E. Wing, Clinical Clerk.)—H. C—, æt. 51, admitted into the Clinical Ward under my care June 3rd, 1868. For about a year and a half she had been troubled with flatus and spasm in the right iliac region, with pains lasting about an hour at a time. Her bowels were then relaxed, and have been so until the last month, during which they have been confined. About a month since she first noticed that her stomach was swollen, and this has gradually increased up to the present time. For the last week she has been very sick, vomiting directly after eating or drinking anything.

She looks well nourished so far as her face is concerned, and presents no appearance of the cancerous cachexia; but her arms, body, and legs are very wasted. The abdomen is greatly distended, measuring $32\frac{1}{2}$ inches round at the umbilicus. It is universally tympanitic, except in the iliac regions, where there is slight dulness. The dulness in the left iliac fossa, however, disappears when she lies on the right side, whereas that in the right iliac fossa is permanent. There is also tenderness, on gentle pressure, in the latter region, but nothing can be felt. She is in no pain, except when the spasms come on. While these last a loud gurgling is heard, and the coils of intestine are seen working and rolling over one another. She has noticed this gurgling for about two months. [The movements of the coils were more evident than in any other case I have ever seen.] The bowels had not been open for a week until yesterday, when she had an injection of soap and water, which operated well. To-day she has had another injection, which has also operated. Her tongue is slightly furred. Her pulse 68, feeble and regular. No hernia can be discovered, nor can anything be felt *per rectum* or *per vaginam*.

She was ordered to take a grain of opium three times a day, and a poultice was placed on the abdomen.

On June 4th she was still in severe pain. The coils of intestine were now permanently mapped out. An enema was given her, which returned with a few shreds of mucus, and a small quantity of clayey fæces. On this day one of the surgeons kindly saw her with me. He pointed out (what I had myself observed) that on "poising" the two loins with the hands the left was the fuller

and heavier. We, therefore, thought it probable that the sigmoid flexure was the seat of the disease. She was ordered to have ice to suck, and to take a grain of opium every hour for three hours, and then to repeat it every four hours. When she got under the influence of the opium, she became much easier, and during the night she had scarce any spasm.

On June 5th we administered an injection with a long tube, for the purpose of determining how much the intestine would hold. The tube was passed up twenty-one inches. About six and a half pints of tepid water were slowly injected, the operation lasting an hour and a half. When the tube was withdrawn, about two pints returned; the rest of the fluid remained in the bowel.

On June 6th she was still much easier, having had no spasm since the large injection was administered. She had brought up a porringerful of vomit. The abdomen was generally tympanitic, except in the *left* lumbar region, where there was some dulness, which, however, was much less marked when she was turned over to the right side. There was no tenderness of the abdomen generally. On this day Mr. Wing discovered, and pointed out to me "a hard lump, like a collection of fæces, in the right iliac fossa, where there is slight tenderness." The abdomen was now much softer than before, and this enabled the tumour to be detected. The coils of intestine, too, were much less plainly visible than they had been at one time, and the vomiting was less urgent.

On July 7th she felt comfortable, and had had a good night; pulse 70. During the 8th and 9th of July she had no return of the spasms, and took a fair quantity of nourishment, consisting chiefly of eggs, oysters, brandy, and such things as seemed least likely to increase the accumulation in the intestines. On July 9th she passed nineteen ounces of urine during the twenty-four hours.

On July 10th she was worse again. She had slight return of the spasms, and the vomiting was more urgent, the vomited matters tasting more nasty than they had ever done. Pulse 68. Tongue moist, rather furred. Skin cool. She passed fifteen ounces of urine during the twenty-four hours. On the 11th she was in much the same condition, but, perhaps, somewhat easier. The abdomen now measured 30½ inches at the umbilicus, or two inches less than when she was first admitted.

On July 11th Mr. Durham, who had seen the case with me for some days previously, determined to make the attempt to give her relief by a surgical operation. In arriving at this determination, he was, I believe, influenced by somewhat different considerations from those which guided me. I did not feel sure that the obstruction was in the cæcum. In spite of the fact that a hard mass could be felt in the right iliac fossa, I retained a doubt whether the disease might not be in the sigmoid flexure, as had been thought some days before. In favour of this view were the fulness and deficient resonance in the left loin, and the slowness with which the symptoms had been developed. Mr. Durham, on the other hand, was satisfied that the seat of obstruction was the cæcum, which proved afterwards to be the case. But he thought that the aspect of the patient was opposed to the idea that cancerous disease was present, and he hoped that he might be able to dilate the diseased part even if he should open the bowel beyond it, and that thus the obstruction might be relieved. We were agreed that, even if this could not be done, it would be possible by operating in the right loin to determine with certainty the exact nature of the disease, without wounding the peritoneum. The operation

was, in its early stages, that ordinarily practised for opening the colon in the loin. But when the outer surface of the peritoneum was reached, the ascending colon was seen to be empty. The peritoneum was, therefore, pushed on one side, and the fingers were introduced externally to it into the iliac fossa. A large hard tumour was then quite plainly felt, and by placing the other hand on the surface of the abdomen, it was determined that this was the same mass which had before been observed.

Mr. Durham, then, after consultation with his surgical colleagues who were present, proceeded to open the ascending colon, with the hope of reaching the ileum through it. On introducing a finger into the bowel, it passed into the mass, and a small quantity of offensive sanguineous and fæculent discharge escaped. The peritoneum was then opened, and an unsuccessful attempt made to reach the bowel above the seat of disease. The edges of the opening into the colon were firmly secured to the skin by sutures, and a poultice was placed over the incision. Into this poultice a small quantity of fæcal matter afterwards escaped. She was cold a few hours after the operation, but she subsequently rallied.

On the afternoon of the 12th Mr. Durham passed a No. 10 catheter into the wound and through the stricture. Air and fæces escaped by the instrument, which was left in; a considerable quantity of fæces afterwards passed through it. About this time, however, the abdomen began to be tender, and symptoms of peritonitis subsequently became more marked; collapse set in, and she died at 3.20 a.m., on the morning of the 13th, thirty-eight hours after the operation. At midnight she had been free from pain, but this afterwards returned. She was conscious to within half an hour of the time of her death. She had had no vomiting since the operation.

The post-mortem examination was made by Dr. Moxon. The peritoneum was minutely injected, and deeply reddened along the *suction* spaces. The cavity contained about a pint and a half of dirty-looking yellowish liquid. There was a little pus in the groove between the ligaments of the bladder and uterus. Resting on the iliacus muscle was the disease, a rounded mass which measured about four inches in length; two and a half inches above it was the opening into the colon.

The finger passed rather easily through the affected part of the bowel; on opening it up it was found to be a corrugated thickening of the cæcum and the parts of the bowel joining it. Thus the wall of the bowel was bent in and out in three places, and the intervening parts were filled up with an areolated gelatiniform material. The disease was thus colloid cancer. There were no secondary formations anywhere.

The large intestine was empty, the small intestine immensely distended; the ileum so much so that a single bend of it, or rather a knuckle, filled the upper opening of the pelvis. Even the duodenum was exceedingly swollen out, and the stomach was of very large size. The wall of the small intestine was also very thick, feeling like cloth.

Cæcum and adjacent part of ileum.—CASE 34.—Mary Ann C—, æt. 33, admitted into Lydia Ward under Dr. Rees' care, June 4th, 1868. (This case was reported by Mr. Hubert Airy, M.A., M.B.)

She has always been of costive habit, and has taken much aperient medicine. For the last year or eighteen months she has suffered from pain in the stomach,

seated above the umbilicus. The pain "moved about, but came on just like spasms." No movements of the intestines have ever been observed until the present attack. For the last six months she has been losing flesh.

On June 1st, just when her menstrual period was coming on, she was seized with severe pain "at the bottom of the stomach," and vomited "stuff like muddy water." The vomited matters, if not at once distinctly of fæcal character, became so two days afterwards. The pain was of the same kind as that which she had before, but more severe. Her bowels had been freely opened by medicines three days before her seizure (May 29th); there was no further action until after her admission, when a warm-water injection was given, which brought away some small-sized, lumpy, greenish fæces.

On her admission she was ordered *Mist. effervesc. Stis horis*, an enema *saponis* at bedtime, and a draught containing twenty minims of chloroform. On the 6th four grains of calomel were given, with some *Extr. coloc. co.*

On June 9th the history of her case was first taken by the ward clerk. Her face was pale and anxious; breathing quick; abdomen distended, but not tight. Convolutions of the small intestines well marked; cæcum and colon not distended. There was tenderness of the epigastrium. Spasms of the bowels came on very frequently, and they could then be felt in tight hard contraction, with great increase of the pain. Vomiting occurred whenever any food or drink was swallowed. The urine was rather scanty and high coloured. A warm poultice was directed to be placed over the abdomen, and a grain and a half of opium to be taken every three hours. A turpentine injection was administered on the 10th, and again on the 12th.

Under this treatment the spasms abated, and the vomiting was less. On June 12th I made the following note: "She looks less haggard and depressed to-day. She has passed nothing per anum, not even flatus. She has only vomited twice this morning, but was sick several times yesterday.

"The abdomen is very little distended. There is no fulness in the loins, and everything points to obstruction of the small intestine. The coils are not visible while she is quiescent. Pulse 128; tongue not much furred, red at the edges; urine clear, very scanty, not more than a tablespoonful being passed at a time."

She gradually sank, and died at 7 a.m. on the 14th of June. She was in great pain about 3 a.m., and Mr. Stocker was sent for, who prescribed *Tinct. Opii m.x.* The pain was somewhat allayed, but soon returned; and the dose was repeated, but with little effect. There was violent straining, and motions were passed twice, at first liquid, but afterwards solid and copious.

On post-mortem examination the coils of the small intestine were distended, while the colon and cæcum were collapsed. The cavity of the abdomen contained fæcal matter, which had escaped by a perforating ulcer, about half way down the small gut.

The constriction was found at and above the cæcum, where for a distance of four or five inches the intestine was strongly puckered by three or four scar-like patches of hard cancer in the peritoneal coat, by which in at least one place the mucous and muscular coats also were involved. Higher up the peritoneal coat was found to be studded with white cancerous points. On the mucous surface were several ulcers (? malignant) at different distances, at one of

which the perforation had occurred. The muscular walls of the bowel above the constriction were hypertrophied.

The greater curvature of the stomach presented a large hard mass of sarcomatous cancer. Similar disease also existed in the mesenteric glands, and along the border of the stomach. Both ovaries were occupied by hard cancer, like that in the stomach, but yielding no milky juice on scraping.

The proportionate frequency of stricture in different parts of the large intestine which I have already given at p. 303, as deduced from these cases, may be compared with that shown in the table which was drawn up by M. Duchaussoy. This writer found that the number of cases of cancerous disease was for the

Rectum	6
Rectum and termination of sigmoid flexure	3
Sigmoid flexure	3
Descending colon	3
End of colon	2
Transverse colon (1 being in its centre)	6
Commencement of transverse colon	1
Right half of arch	2
Cæcum.....	1

These figures accord pretty closely with those given above, excepting that the transverse colon would appear from them to be rather a frequent seat of disease; whereas it has not been the affected part in any of the recent cases at Guy's Hospital. Probably this may be attributable to the fact of the splenic and hepatic flexures having been included in the transverse colon in M. Duchaussoy's table. It must further be borne in mind that this writer collected his cases from observations which were recorded by others, possibly for the very reason that they were rare or exceptional; whereas my cases are taken without any selection whatever. It may, perhaps, be right to remark also that the table given at p. 303 includes only those cases in which intestinal obstruction existed. A large proportion of cases of cancer of the rectum are excluded, in which symptoms resembling those of dysentery were present; and no doubt many cases of cancer of other parts of the bowel, in which, for the purposes of our rough clinical classification, the disease was placed under the head of "abdominal tumour."

The statistics given by Dr. Brinton lead to nearly the same results. "Of 100 cases," this writer says, "4 are in the cæcum,

10 in the ascending colon, 11 in the transverse colon, 14 in the descending colon, 30 in the sigmoid flexure, and 30 in the rectum."

It thus appears that all observers are agreed as to the frequency of strictures of the rectum and sigmoid flexure, as compared with any other part of the large intestine, and, generally, as to the frequency of stricture in the left side of the arch formed by the gut as compared with such disease in its right side.

With regard to the pathological nature of the disease in the twenty-two cases of which the notes are given above, it was cancerous in all but two or three, or possibly four. Secondary cancerous deposits, however, seem to have been but seldom observed, being mentioned in four or five cases only. In four instances the disease was termed "villous cancer."

Simple stricture of the large intestine appears not to be very uncommon. To the cases of such an affection above quoted may be added one recorded by Mr. Hilton in the last volume of the 'Guy's Hospital Reports.'

I have already remarked that no instance of *fatal obstruction* from a true stricture of the small intestine has occurred at Guy's within the period from 1845 to 1868. The following is the only case that I remember to have met with in which anything that could be fairly called a stricture existed in that part of the bowel. In this instance there was not merely one stricture, but several; but diarrhœa rather than constipation had existed during life.

CASE 35*.—A. B—, æt. 12, admitted September 12th, 1858; died November 9th. She had been ill for three or four months before her admission. She had a tumid abdomen and diarrhœa. The child could never take any medicine, and very little food. On post-mortem examination numerous large tubercular ulcers were found in all parts of the intestine, extending quite round the bowel. A remarkable narrowing had taken place, which appeared to be due to contraction of the peritoneal coat. This was observed on opening the intestine, when the enterotome would hardly pass the diseased parts. The child died of tuberculous disease of the lungs.

One point of some interest in reference to these cases of stricture is the fact that, at the post-mortem examination, the blade of the enterotome often passes readily through the diseased part, even when the obstruction during life had been absolute. This seems sometimes to have been due to the pro-

jecting inwards of folds of mucous membrane or cancerous growth, which acted as valves. It evidently was so in Case 13. In other instances we must find some other way of accounting for the completeness of the obstruction, and we have then a choice of two explanations. It may have been due to a contraction of the muscular coat of the bowel at the seat of stricture. That this is sometimes the case may, perhaps, be argued from the fact that the coat is so generally found hypertrophied; for although excessive peristaltic action might account for hypertrophy of the muscular fibres *above* a stricture, it is not clear that it will explain their increased growth at the very spot diseased, as appears from the descriptions to have been found in many instances. The other view that might be taken is that the obstruction arises from a bending of the bowel on itself at a sharp angle, so as to obliterate its calibre. For, in stricture of the rectum, the natural curves of the sigmoid are greatly increased; and the transverse colon is often sharply bent on itself, so as to form two vertical coils, lying parallel with and between the ascending and the descending colon, and with them covering the whole surface of the abdomen. This explanation was adopted by Mr. Hilton to account for the remarkable circumstance, which occurred in the case published by him in the last volume of these Reports, that after the colon had been opened in the loin fæces escaped freely through the natural passage, which had before been obstructed.

It is a noteworthy fact, which has been mentioned by more than one of those who have written on this subject, that in cases of stricture of the left side of the large intestine, the accumulation of fæcal matters is often greater in the cæcum than in the part of the bowel which intervenes between it and the stricture; and that the cæcum consequently becomes the seat of inflammation, ulceration, and even perforation. See Cases 14, 22, 28, 29. On the theory that an antiperistaltic movement occurs in these cases, this would be explicable enough; but now that Dr. Brinton seems to have shown the erroneousness of such a theory, the cause of it is not very clear. The fact, however, remains; and it is one which it may sometimes be important to remember. Dr. Wilks has mentioned to me that he had seen, in his private practice, a case of stricture of the colon which (although it never caused total obstruction)

gave rise to accumulation in the cæcum, to inflammation and perforation of this part of the bowel, and consequently to the death of the patient.

Of all the forms of intestinal obstruction stricture is, perhaps, that which most commonly is attended with well-marked characters, which stamp it and enable it to be distinguished from the other varieties of stoppage of the bowels.

The characters which thus distinguish it are its chronicity and the absence of acute symptoms. Absolute constipation, far from occurring suddenly, very often takes place only after a long period has passed, during which the bowels have been confined; and when entire obstruction does occur, an equally long interval may elapse before further symptoms show themselves. Unless the patient should bring on distension by indulging in food, or excite irritation by aperient medicines, weeks and months may pass, even after constipation has set in. Vomiting is generally late, the pulse is quiet, there is an absence of that collapse which characterises the acute forms of obstruction, and the urine is abundant.

On the other hand, it is undeniable that cases occur in which these distinctions fail; and that in a patient attacked with sudden obstruction, who had hitherto been free from any observable symptom, the cause may be a stricture of the large intestine. Mr. Phillips ('*Med.-Chir. Trans.*,' xxxi, p. 17) appears to have been one of the first to note this fact; and it is sufficiently proved by cases which have been recorded.

As has already been shown, the seat of stricture is almost invariably the large intestine; most generally the rectum or sigmoid flexure, but sometimes the right side of the bowel. And as there is no other lesion which thus attacks indifferently all parts of the colon, and at the same time is sufficiently chronic in its course to present marked differential characters according to its exact seat, this would appear to be the proper place to consider how we may determine precisely which part of the large intestine is affected in a given case.

In the first place, it is to be observed that in some cases a stricture, or a cancerous mass, may be felt by introducing the finger into the rectum. If so, the diagnosis is complete. It should, I think, be laid down as a rule in medicine, that the

rectum is to be examined in every case in which there is obstinate constipation of the bowels. If the finger should fail to discover any disease, and if the symptoms point strongly to the lower part of the gut as the seat of obstruction, it would be well to place the patient under chloroform, and to introduce the whole hand, as has recently been recommended by Mr. Maunder.

A symptom of some value, at any rate, in cases of stricture of the rectum, is the fact that, before obstruction set in, the motions have been narrower than natural, owing to their having been forced through the strictured part of the bowel. If the *fæces* are actually observed by the surgeon to be of such a character, the fact is of considerable importance, and may, no doubt, sometimes lead to the discovery of a stricture which is beyond the reach of a digital examination. But I am, for my own part, indisposed to place much reliance on the statement of a patient that the motions have some weeks since been abnormally narrow. To expect a trustworthy answer to an inquiry upon this head is to demand more than can ordinarily be looked for, at least from the common run of hospital patients. It has not yet, I think, been determined how near the anus disease must be for such an effect to occur. I believe it is the impression of surgeons generally, that it is in the sigmoid flexure and rectum that the *fæces* naturally receive their form; and, therefore, that stricture of the upper end of the sigmoid flexure would not tend to diminish the diameter of the *fæcal* masses. However, in Case 23, above referred to, this was the seat of disease, and yet the patient asserted, and maintained repeatedly, that he had noticed for three months that his motions were smaller than natural. Some careful observations in reference to this question appear to be much needed.¹

Several writers, and especially the late Dr. Brinton, have laid stress on the value of large injections, as an aid to diagnosis. The observer I have named has even laid down

¹ At the present time (December, 1868) there is in Petersham Ward a patient on whom Mr. Cooper Forster has performed colotomy in the left loin for obstruction lower down. The *fæculent* matter pressed out through the wound is in long formed masses, so that some one has compared its discharge to the production of a "Pharaoh's serpent." (See Mr. Forster's paper, p. 333.)

definite rules for our guidance in this respect. "It is quite singular," he says, "how trustworthy I have found the conclusions thus arrived at. For example, with a maximum injection of a pint of warm bland liquid, the obstruction of an ordinary male adult may be referred to a point not lower than the upper end of the rectum. A pint and a half, two pints, three pints, belong to corresponding segments of the sigmoid flexure. The descending and transverse colon accept a larger, but more irregular, quantity. In one case in which it was evident that the stricture occupied the upper part of the ascending colon, nine pints of injection were always found to be the maximum." It is obvious, however, that the correct determination of this point involves a great deal of care. Thus in Case 36 I was assured that as much as two pints of fluid had been thrown up; but I could plainly feel with my finger a rounded mass, apparently of a cancerous nature, growing into the interior of the intestine. Again, a stricture may be pervious to fluid injected from below, although the intestinal contents may be unable to pass through it from above. This seems to have occurred in Case 23, in which there was a mass of disease in the sigmoid flexure, just above the pelvis. In that case four pints of warm water were injected per rectum. Of this, only a small portion returned. The greater part of it was retained, and no doubt passed through the stricture, necessarily adding that much to the accumulations above it. The test, therefore, not only tended to mislead as to diagnosis, but its application was in some degree injurious to the patient.

It is generally admitted that the distance to which a bougie or an enema-pipe can be passed affords no secure basis for the determination of the seat of disease in the upper part of the rectum or sigmoid flexure. On the one hand, the mucous membrane has folds which may resist the passage of an instrument, and lead to the belief that there is a stricture; on the other hand, the bougie may bend on itself, and thus we may be led to suppose, erroneously, that no obstruction exists.

Nor can I think that very safe conclusions are always to be drawn from the form of the abdomen in cases of stricture. Sometimes, indeed, it affords valuable indications. Thus in Case 31, one of cancer at the hepatic flexure of the colon, it was observed during life that the cæcum and ascending colon

were distended, and not the descending colon. Again, when the rectum or the sigmoid flexure is the seat of obstruction, the lumbar regions and the epigastrium are no doubt generally prominent, and the course of the colon is more or less plainly mapped out. But the following cases tend to show that these indications are not necessarily present,

CASE 36.*—Mrs. P—, of Elizabeth Street, Walworth; January 9th, 1868. Her bowels had not been open for between three weeks and a month. She was sick, vomiting matters which were at that time bilious and of a greenish colour, but which, I was assured, had been distinctly stercoraceous. Hard rounded coils of intestine could be plainly felt, and there was marked peristalsis, with audible borborygmi. The belly was rounded, projected rather forwards, and was not generally distended. The sides of the abdomen were not at all filled out, and no distension of the large intestine could be discovered.

I was quite uncertain as to the seat of the obstruction in this case until I examined the rectum, when I felt a cancerous mass of some size projecting into its interior.

In another case which has recently been under observation at the hospital the same thing was still more marked, but in this instance the obstruction was incomplete. The case was one of disease of the splenic flexure of the colon. It has already been described as Case 30. E. B—, æt. 61, had been admitted into the Clinical Ward under Dr. Wilks in the spring of 1868 for gout. While he was in the hospital symptoms of intestinal obstruction arose, but they afterwards subsided, and he went out again. He was readmitted September 26th, 1868, with frequent vomiting (which had even been stercoraceous), obstinate constipation of a week's duration, and great distension of the abdomen. He was ordered an enema colocynthidis immediately, and a grain of opium three times a day. The abdominal symptoms gradually subsided. On October 5th the abdomen was supple and flaccid, so much so that when he lay on either side the bowels fell over, dragging the navel out of the median line, and producing a deep hollow, from the ribs to the iliac fossa, on whichever side happened to be uppermost. At this time the bowels were open three or four times a day, but the coils of small intestine could be seen through the thin parietes, and moved downwards distinctly during inspiration.¹ These appearances led to the erroneous inference that the disease was seated in the small intestine. He gradually sank and died without ever having a return of the symptoms of complete obstruction.

On the other hand, I have seen more than one instance in which a prominence of the epigastrium, and the appearance of

¹ This may appear remarkable to some who think that the liver and spleen are the only abdominal organs which can be seen to descend with the diaphragm. I have, however, repeatedly seen scirrhus tumours of the pylorus so descend; and there is a boy now (December, 1868) in the hospital, believed to have disease of the cæcum, in whom the intestines are distended, and can be observed to move downwards as he breathes.

a large horizontal coil of intestine in this situation, have led to the conclusion that the transverse colon was distended; but in which the seat of disease was, nevertheless, in the ileum, the distended coil being likewise part of the ileum, dilated (as it is under such circumstances) until it rivalled the colon itself in size. See, for instance, the reports of Cases 56 and 73.¹

Thus, it would seem that the *absence* of fulness in the course of the colon is no *proof* that the disease is high up in the intestine; nor its *presence* that the seat of the obstruction is in the left side of the large intestine. It is not meant that these signs are of no value, but only that we must not rely on them too implicitly.

Again, if one hand be placed in each loin of a patient suffering from obstruction, we may, by "*poising*" the two sides, be able to determine that one side is fuller than the other. This sign, however, like the others, is not infallible. Thus, in Case 33, one of the surgeons, who was kind enough to examine the patient with me, noticed (as I had myself previously noticed) that the left loin was heavier and fuller than the right. We, therefore, thought that the seat of disease was the sigmoid flexure or the rectum. But it subsequently turned out that the case was one of cancer of the cæcum.

It is of no little importance to observe that in the very great majority of cases a stricture of the bowel is seated in the left side of the large intestine. Hence, whatever indications be relied on, he who declares for this seat will generally be right. Let no one, then, set too much value on any one sign or symptom merely on the ground that he has over and over again correctly diagnosed disease of the sigmoid flexure or rectum by means of it; or, when the exceptional case of stricture of the cæcum or ascending colon occurs, he may, perhaps, find that the sign on which he relies has led him into error.

IV. CONTRACTIONS.

Under this title I place a class of cases which, although they are not infrequent, have, nevertheless, received comparatively little attention from systematic writers. They resemble cases

¹ This very error was committed in a case of obstruction of the ileum recorded by Mr. Luke ('Med.-Chir. Trans.,' xxxv, p. 245).

of stricture in this,—that the pathological process is one involving more or less the coats of the obstructed bowel itself; and, in the same respect, they are unlike cases of “*internal strangulation*” by bands, &c., in which the strangulating agent has no such structural connexion with the part of intestine strangulated. On the other hand, a stricture differs widely from the kind of disease now under consideration, in that while the former is generally localised to one part of the bowel, and affects no other organ, the latter either binds two or more coils of intestine together, or fixes the gut to the abdominal wall, or to some viscus; or, again, consists in a cancerous or other affection of the mesenteric glands close to the intestine, narrowing its calibre. Cases in which there is such disease of the glands might, so far as systematic arrangement goes, be conveniently placed in a separate class; but I think that the perusal of the series of cases which follows will suffice to show that such a distinction would be quite arbitrary.

Of the 16 cases which follow, only 3 affected the large, 13 the small intestine. In one of these cases, however, death occurred before symptoms of intestinal obstruction showed themselves, or without their being fully developed.

CASE 37.—Constriction of the sigmoid flexure by adhesions; strangulation; death in seven days.—W. B—, æt. 56, was admitted into John Ward under Dr. Habershon's care, July 19th, 1861, suffering from intestinal obstruction of six days' duration. He was understood to have had attacks before. There were symptoms of peritoneal inflammation; he was pulseless and cold, and died on July 20th.

At the post-mortem examination, which was made by Dr. Wilks, the abdomen was much distended, and there was general recent peritonitis, with lymph between the coils, &c.

There were old adhesions between various parts of the large intestine. The cæcum was coiled up and adherent to the ascending colon, the transverse also forming a loop by adherent omentum over it. The sigmoid flexure was adherent to the mesentery and by firm bands to the cæcum, and this had caused the fatal obstruction. Lying in the pelvis was a large distended loop of intestine, of black colour, and almost gangrenous. This, on being lifted up, was found to be the sigmoid flexure. It was bound down to the spine by firm fibrous tissue, both at its upper and its lower end, these being contiguous. There was thus a double stricture, but the lower of the two was the tighter, and the one which had caused the total strangulation. The mucous membrane of the distended part of the bowel was soft and commencing to slough, and was of a dark purple colour, separated by a defined line from the pale hue of the mucous surface of the rectum below the constriction.

CASE 38.—*Obstruction of the transverse colon by adhesion to the neck of an umbilical hernia.*—M. D—, æt. 57, admitted on December 19th, 1859, suffering from a large umbilical hernia. She had had constipation for some time, and was exceedingly ill. The hernia was never completely reducible, but was larger at some times than others. Mr. Poland was about to operate, but on applying the taxis, he managed to reduce the tumour somewhat, and (according to the patient) to its ordinary size. However, she died a few hours later.

The post-mortem examination was made by Dr. Wilks.

The hernial sac was found to be nearly filled with adherent omentum. At the neck of the sac the transverse colon was firmly adherent, and had been slightly drawn into its interior by the omentum, so as to form a small pouch. That this had been sufficient to obstruct the bowel, although there was no evident constriction of its calibre, was evident from the fact that all the colon above was much distended, while that below was contracted and empty. The cæcum in particular was immensely distended; it almost filled the lower part of the abdomen, and was of a dark purple, or almost black, colour. Its peritoneal coat was fissured in places, its mucous membrane was lacerated transversely, and its walls were so thin, that it was difficult not to rupture them in handling. The colon and the small intestine leading to it were filled with semifluid fæcal matter, such as is generally met with in cases of intestinal obstruction. There was a general peritonitis, the coils of intestine being all adherent together.

CASE 39.—S. A. S—, æt. 21, admitted into the Clinical Ward under Dr. Habershon's care, June 29th, 1864. She had been well until a week before admission, when she was seized with pain in the abdomen, sickness, &c. These symptoms increased, and were accompanied with constipation. She took aperient medicine without any result. The abdomen became distended, and at last stercoraceous vomiting occurred. An injection having been given some fæcal matter came away, and thus it was never very clear that a complete obstruction existed.

A post-mortem examination was at first refused; but after three days the friends gave their permission, and Mr. Pusey made it at the house where the woman had lived. There was slight recent peritonitis. The transverse colon was dragged down and adherent to the mesentery over the lumbar vertebræ. This had caused the constriction of the intestine.

CASE 40.—*Chronic obstruction of the lower end of the small intestine by contraction from old Peritonitis.*

(From notes by Mr. Birkett's dresser, Mr. JOSHUA DUKE.)

M. A. R—, æt. 15½, admitted into Martha Ward under Mr. Birkett's care, May 28th, 1868. She has generally had delicate health, but has not been constipated.

On May 13th, while sitting at needlework after dinner, she first felt very ill, suffering from acute cutting pain in the abdomen, which in the evening became worse. The focus of the pain was seated at the umbilicus. She also had looseness of the bowels, followed during the next week by constipation and the passing of hard fæces.

On the 15th of May she took some medicine for the first time; vomiting com-

menced shortly afterwards. On the 17th the pain and vomiting were worse; an injection of gruel was given, which immediately returned uncoloured by any faeces.

She varied in condition from day to day; sometimes better, sometimes worse. On the 25th she felt better, and got up during the day. She also passed some small hard scybala. In the evening the pains and the vomiting returned worse than before. Since then the bowels have not been opened.

On May 27th she was very ill. The vomited matters, hitherto greenish, became distinctly fecal in appearance and smell, and were very abundant.

On admission (May 28th) the report says: "The girl is very thin, and has a very anxious expression. She is supported in her bed by pillows, and suffers constant paroxysms of pain across the abdomen, but chiefly round the umbilicus. The abdomen is very distended and tender on pressure. The convolutions and peristaltic action of the intestines are plainly visible. Around the umbilicus, and over the small intestine, the percussion note is tympanitic; in the course of the large intestine it is dull, especially over the sigmoid flexure. The tongue is brown and slightly dry. Pulse 96, soft." On introducing the finger into the rectum nothing could be felt, except that the anterior wall of the bowel seemed to be encroached upon.

She was ordered to have milk and ice, and to apply hot fomentations. The question of exploring the abdomen was considered by Mr. Birkett, but there seemed to be no grounds for undertaking so dangerous an operation. She was ordered frequent doses of tincture of opium.

The severity of the symptoms rapidly increased, the pain being so severe as to make her scream out. At midnight on the 28th she passed ten ounces of urine.

On the 29th, at 2.15 p.m., all the urgent symptoms continuing, Mr. Birkett passed a fine trocar and canula into the bowel, about two inches below, and four inches to the left of, the umbilicus. A mixture of air and fluid immediately came out with a whiz. A small piece of wire was then passed down the tube, and a thick brownish fluid continued to run through it, looking just like peasoup, and very offensive. The patient soon afterwards said she was much relieved, and her expression became less anxious. At 3.30 the fluid was still flowing. The peristaltic action of the intestine carried the tube round and round, giving rise to great pain. She was ordered fifteen minims of tinct. opii in brandy. At 4.30 she was in so great agony that the tube was removed by Mr. Elliott, the house surgeon. A pint and a half of fluid had passed through it. For the next hour and a half the patient's sufferings were very great, causing her frequently to cry out. She had twenty minims of tincture of opium. At 7 p.m. she vomited about two drachms of beef tea, without any faecal odour. At 9.30 the pain was much less, occurring in short paroxysms every quarter of an hour.

30th.—She has passed a very quiet night, wandering at times. She has not vomited; expression less anxious; pulse 120, small, very compressible; tongue clean and moist; abdomen tense and distended, and more tender than formerly, especially round the seat of puncture. Paroxysms of pain recur every five minutes, but are less violent. To take tincture of opium in moderate doses, frequently.

31st.—The abdomen is very tender; it is distended and tympanitic (except over the large intestine). There is no vomiting. She looks less anxious, and says she is better; but her tongue is drier and browner; her appetite is ravenous.

Nothing has been passed per rectum. Ordered an injection of starch, with thirty minims of tincture of opium.

At 9 p.m. she vomited about fifteen ounces of fluid looking like beef tea, but with very little faecal odour. She slept until 4 a.m., when pain returned, and she suffered greatly from distension.

During the next few days she remained in much the same condition. The abdomen was very tender; no peristaltic movements could be seen. The pain occurred in paroxysms, followed by intervals of ease. About once a day she vomited from ten ounces to a pint of fluid looking like faecal matter, but having sometimes a sour rather than a faecal smell. On the evening of the 4th of June she had an injection of beef tea. This returned uncoloured, but with four small yellowish-white scybalous masses, looking like putty.

On the 5th she had passed urine freely during the night, had slept well, and looked much better. Pulse 128; tongue furred but moist. At 11 a.m. an injection of half a pint of beef tea was given, after which she passed wind freely and felt great ease.

On the 7th she looked more pallid and felt weaker. Abdominal tenderness continued. An injection was given which was retained for an hour. Afterwards she again passed wind freely.

On the 8th the dresser, Mr. Duke, was called up in the night, the patient having been attacked with sudden pain in the right hypochondrium, "as if knives were run into her." Pulse about 140. General condition depressed and low. Some opium was given, and the pain soon passed off; but she was left pale and much exhausted. In the forenoon she could not speak above a whisper.

She remained in much the same state, suffering on some days very little pain, but always very prostrate. She had also become much emaciated, and her eyes sunken. The abdomen continued to be very tender.

On the 12th aphthæ appeared on the mouth and lips. The prostration and collapse were extreme, the features pinched and anxious. Mr. Birkett remarked that the case was hopeless. At 3 p.m., after very acute pain, two large faecal pale yellow scybala, with hard centres, were passed into the bed. On introducing the finger into the rectum it was found to be distended with faeces. An injection of a pint and a half of gruel was gradually thrown up, which caused much pain. Soon afterwards a copious pale yellow motion was passed, consisting of ordinary faecal matter. The patient expressed herself as much relieved, and her face became less anxious. During the evening faeces were passed freely four times (twice into the bed). The evacuations were carefully examined, but no intestinal tissue could be found in them.

She passed a good night, and on the 13th the abdominal tenderness and tension were less. She suffered little pain, but was very weak. During the night she had vomited about a pint of liquid, having a sour odour.

On the 15th a purplish discoloration over the thorax was noticed.

On the 16th a blue purpuric discoloration extended over the whole body. Since 4 p.m. on the 15th she had been greatly purged. She suffered violent pain in the epigastrium and became faint; and then the evacuations passed from her into the bed without her knowing it. The abdomen on the 16th was greatly diminished in size; but the patient fainted away repeatedly, and was evidently near her end.

She continued to pass liquid stools unconsciously, grew gradually weaker, and died on the 17th at 11 a.m., retaining her consciousness to the last.

The post-mortem examination was made by Dr. Moxon. The peritoneal cavity contained about three pints of pus, and also flakes of yellow lymph. The small intestines contained a quantity of liquid fæcal matter. They were generally a good deal distended. At its lower end the ileum was narrowed and fastened to the edge of the pelvis, near the cæcum, by contraction of its thickened peritoneum. The small intestine was the only one of the contents of the abdomen which was free; all the other viscera were closely united by organized connective tissue. Both pleural cavities were closed by adhesions of exactly the same appearance, and probably of the same date. It was a continuation of these adhesions which had caused the close puckering of the ileum under its coat. The intestine at this spot was of a dark bluish colour, and its peritoneal coat was patched with extra thickening. There was no other situation, nor sign of constriction, except this at the end of the ileum, and the obstruction had not been complete immediately before death, for the colon beyond was in a natural state of distension. The sigmoid flexure was narrow, and bent with an unusual sharpness of curve; but there was no appearance of constriction about it.

CASE 41.—*Chronic peritonitis; adhesion of intestines to the uterus affected with cancer.*—Mary C—, admitted under Dr. Gull's care June 29th, 1863. She was too ill to give a history, but her symptoms consisted of vomiting and constipation, as if there were obstruction of the bowels.

On post-mortem examination there was found to be general chronic peritonitis. The viscera were connected together by adhesions, but these could be separated by a little force, showing that the inflammatory product was not very old. The omentum was much thickened, but the adhesions were greatest in the lower part of the abdomen, as if the inflammation had commenced within the pelvis, which no doubt had been the case. There was cancerous disease of the uterus, infiltrating its tissue as well as forming a tumour.

CASE 42.—*Contraction of jejunum by adhesion binding it down. Matting together of intestines. Omentum changed into fibrous cords.*—J. E—, æt. 19, admitted under the care of Dr. Rees into John Ward, December 14th, 1862.

When admitted he was suffering from violent vomiting and constipation. After a time he became better. He then had another attack, the vomiting being always most urgent. The abdomen was contracted. He was at times delirious, and this led some of those who saw the case to think that it might be altogether one of cerebral disease.

The account of the post-mortem examination is from the report made by Dr. Wilks.

The body was spare, of a remarkably dark colour (such as is seen in cholera); the *facies* expressive of abdominal disease. Peritonitis existed in its very earliest stage, as indicated by vascularity and slight greasiness of the surface. On opening the abdomen the colon was seen to be contracted. Below this were two coils of greatly distended small intestine; and on lifting these up, the rest of the small intestines were seen coiled up in a very small space.

When the abdomen was first opened, the omentum was observed to have altogether lost its membranous character, and to consist of a number of cords which passed down and were adherent to the abdominal wall and intestines. One of

these was attached to the ileum, where it joined the cæcum; and this in some degree constricted the bowel. The seat of actual strangulation, however, was high up in the jejunum, exactly four feet from the pylorus. At this point the small intestine was bound down to the spine, over the last lumbar vertebra. The constriction was caused by a piece of firm fibrous tissue, which, however, did not form a distinct band, but was closely united to the intestine itself, as if the original lymph had become incorporated with the peritoneal surface before the contraction took place. The bowel above this point was much distended, and of great weight, and bent back at an angle, so that no doubt the obstruction during life had been complete. This part of the intestine contained a fluid of yellow colour, and of fæcal appearance, but without distinct fæcal smell. On opening the intestine the constriction was found to admit the point of the little finger.

In several places the small intestines were united together.

Closely similar to this is the following case, of which, however, the report is somewhat scanty :

CASE 43.*—G. S—, æt. 47, was admitted under Dr. Addison's care, April 12th, 1848; some weeks before his death there were indications of ruptured bowel; he died on June 21st.

There was general peritonitis, the abdomen containing a dirty serous liquid, tinged with fæcal matter. The intestine was very much distended as far as the lower fourth of the ileum. Here an abnormal condition existed, "in consequence of adhesions between portions of ileum and of loops formed by bands of omentum, through which coils of ileum had passed. It is impossible" (the report goes on), "by writing, to convey an accurate idea of the intricate state of parts. Complete obstruction was not effected by any one band."

CASE 44.—*Strangulation of jejunum by adhesions from peritonitis, set up by external injury.*—M. A. B—, æt. 47, was admitted into Mary Ward under Dr. Rees' care, September 1st, 1858, and died on September 28th. During this time she suffered from symptoms of peritoneal mischief, abdominal pain, vomiting, &c. She was said to have received a blow.

The post-mortem examination was made by Dr. Wilks.

Slight general peritonitis was present, and in the middle of the abdomen a circumscribed peritonitis of a more advanced and severe character. The omentum was adherent to the parietes and to a portion of the small intestine below, all of which parts were of a dark green colour. A portion of the upper part of the jejunum, about a foot in length, was of a dark violet colour, as if it had been strangulated. This was not loose, but adherent to adjoining coils. All these parts were covered with lymph. The mesentery of that part of the intestine which looked as if strangulated was swollen and filled with coagulated blood. The intestine itself was perfectly free from any constriction, and had evidently been in its position for some time; nor was there any umbilical hernia to account for its strangulated appearance. It was, therefore, thought that a blow might have set up the mischief, and this was strengthened by the presence of an ecchymosed patch on the integument opposite to the inflamed part of the bowels.

In the cases above recorded the primary cause of the con-

traction has generally been a chronic peritonitis. It might, therefore, be thought that ordinary strumous peritonitis would be very likely to give rise to similar effects. Such an occurrence must, however, be rare, for I have looked up all the fatal cases of this disease in our more modern post-mortem records, without having met with any one in which symptoms of obstruction are stated to have existed.

The following case, of which there is no history, shows at any rate that strumous peritonitis may cause narrowing of the intestine to such a degree as to lead to dilatation and thickening of the bowel above the narrowed part.

CASE 45.*—*Strumous peritonitis.*—M. P—, æt. 14, under the care of Dr. Bright. She had had urgent symptoms for about two months, particularly continual vomiting of green bilious matter. The intestines were much matted together, and ulcerated. "A portion of what appeared to be ileum was considerably dilated and thickened; it was of a dull red colour. . . . The sharp turns formed by some of the convolutions, and their retention in this position by peritoneal adhesion, appeared to have afforded considerable obstruction to the passage of the fæces, and to have occasioned the great dilatation before mentioned. . . . The colon was much contracted. . . . Numerous patches of tuberculous matter were sprinkled over the abdomen, but especially on the intestines."

But if strumous peritonitis rarely leads to obstruction of the bowels by contracting their calibre, the same cannot be said of cancerous peritonitis, of which one of the most common symptoms is such obstruction. So far as their *symptoms* are concerned, indeed, cases of cancerous peritonitis may be divided into two groups; the one attended rather with ascites, the other rather with vomiting and constipation, and ultimately with entire closure of the bowels.

CASE 46.*—*Contraction of the ileum by cancer, and adhesion to the abdominal walls.*

(From notes kindly furnished to me by Mr. E. R. RAY, of Dulwich.)

Mrs. M—, æt. 59, a stout, florid person, the mother of a large family.

In April and May, 1868, she came under Mr. Ray's care on account of uneasy sensations in the abdomen, described as "dragging" rather than pain, and referred especially to a spot just above the pubes. Her bowels were constipated; her urine scanty, of high sp. gr., and containing a small quantity of albumen. She was ordered salines, compound jalap powder, and occasionally podophyllin in the dose of half a grain. Under this treatment she got well.

In the middle of July she had an attack of diarrhoea; she was then staying at Brighton.

On August 3rd she again came under Mr. Ray's care. She was complaining

of pain about the umbilical region, and said that for two or three days she had felt as though she was going to have an attack of diarrhoea. However, the bowels were rather constipated, acting but slightly every other day or so. The urine was rendered turbid by heat or by acid. She took some compound jalap powder, which acted but slightly, and gave a great deal of pain. There was no tenderness on pressure over the abdomen.

Her symptoms increased up to the 6th, when Dr. Fagge saw her in consultation with Mr. Ray. In the morning, after taking a purgative, she had been sick for the first time. This gave her great pain, which came on in attacks resembling labour-pains in intensity and in regularity.

On carefully examining the abdomen, we discovered a hard mass to the right of the umbilicus and a little above it. In consequence of the large quantity of subcutaneous fat it was impossible to make out more than the existence of some disease at this spot, which was also the exact seat of her pain. The pulse was between 90 and 100, and the tongue clean. The question whether the mass now noticed for the first time was of a cancerous nature was discussed, but her healthy appearance and well-nourished frame seemed to be opposed to such a view. It was, therefore, hoped that it might be of inflammatory origin. A blister was applied, and she was placed slightly under the influence of opium, which relieved her pain. She continued to take this drug from that time to her death. Daily enemata were given. These generally returned unaltered, but on the 8th a quantity of feces was brought away, and on the 11th a clot of blood, the size of half an orange. The rapidity of the pulse gradually increased, and the other symptoms became worse. On the 13th the first stercoraceous vomiting occurred. On this day Dr. Fagge saw her again, but nothing more could be made out as to the nature of the tumour. The stercoraceous vomiting was repeated every day afterwards, but only once or twice in the twenty-four hours. A feeling of distension would gradually develop itself, and increase for some time, when vomiting suddenly came on, two or three pints being ejected at once, with great relief to the patient.

Under these symptoms she gradually sank, and died on the 19th. The distension of the abdomen did not increase to any great extent, and no coils were ever visible on the surface of the abdomen. During the week she passed a great quantity of pale urine which contained no albumen.

The post-mortem examination was made by Mr. Ray, Dr. Fagge being present.

After death the abdomen rapidly became enormously distended, so that the tumour felt during life could no longer be discovered on palpation. When the abdomen was opened this tumour was found to consist of the omentum, which was occupied by a firm new growth, forming a flattened mass. This was free in the greater part of its extent, but a narrow cord passed from it, and fixed it in the position in which it had been felt. Although there was so large a quantity of subcutaneous fat, the size of the mass corresponded very closely with what had been felt during life. When this was turned upwards the intestines beneath seemed to be generally healthy, but the hand being passed into the right iliac fossa, a coil was found adherent to the anterior abdominal wall. The intestine was now ligatured above and below this point, and the whole was removed for more careful examination.

It subsequently appeared that the affected part of the bowel was the extreme

lower end of the ileum. Two parts of the intestine, perhaps about a foot distant, were closely approximated, and were both adherent to the parietes. Between them, and in the mesentery, was a hard mass, and on the serous surface of the bowel, as well as on the parietal peritoneum, there were several little isolated granules of a new growth, similar to that which existed in the omentum. The hard mass probably consisted in great part of the natural textures puckered up and contracted. The bowel itself was greatly narrowed at both the points where the chief adhesions existed; the intervening loop being of its natural calibre. One of these points occupied the seat of the ileo-cæcal valve; through this the little finger could not be passed. When the bowel was laid open the mucous surface appeared healthy, except at one spot near the upper extremity of the adherent coil, where a point of ulceration led into an irregular cavity external to the bowel, with sloughing walls, and filled with a fetid fluid.

The plate which is appended to this paper (see Plate II) will probably give a better idea of the disease than this description; but in it the length of the coil appears considerably less than it really is, in consequence of its being twisted and bent on itself, so as to be out of the plane of the drawing.

CASE 47.—Contraction of ileum and adhesion of its coils, with puckering from peritoneal cancer. Incomplete obstruction for nearly six months, with attacks of pain and visible vermicular movements, but no sickness until shortly before death.*

(Reported by Mr. J. P. HARTREE, M.B., Clinical Clerk.)

G. H. W.—, æt. 39, admitted into the Clinical Ward March 25th, 1868, under the care of Dr. Wilks, and afterwards under that of Dr. Fagge.

He states that he has always lived very steadily and has enjoyed excellent health, never having had a day's illness until four months ago.

At that time he began to suffer from pain in the epigastric region. The pain would last for three or four hours, and then go off again. At first it used to recur about twice a week. The frequency of the paroxysms has gradually increased up to the present time, and their duration has proportionately diminished. They now return every three or four minutes, lasting from half a minute to a minute and a half. The pain has lately been more severe, going through to his back.

During the last three months he has lost his appetite, and has fallen away a good deal.

Two months ago he first noticed that his abdomen was a good deal swollen. The swelling commenced in the left iliac region, and at that time the pain was more severe there than in any other part of the abdomen.

His bowels have been costive since the commencement of his illness, and his motions very light coloured. A month ago he passed two very hard, dry and thick motions; and for the next week his symptoms were much relieved. He has constantly taken aperients since he has been ill. He is obliged to get up several times in the night to pass water, being "forced to it by the pain in his abdomen." He has had no nausea nor sickness.

On admission his abdomen is prominent and rounded. Every four or five minutes he has a paroxysm of colic-like pain, during which the intestines may be

seen strongly contracting, so as to upheave the abdominal wall. In a minute or two the pain leaves him, and the movement of the intestines ceases; a gurgling of fluid and gas together is heard as the pain goes off. The chief seat of pain is the left iliac fossa. There is no particular tenderness on pressure. No tumour can be felt.

The abdomen is resonant in the median line from the ensiform cartilage to an inch below the umbilicus, and for two inches on each side of the line between these points. Elsewhere it is dull.

His bowels were well opened yesterday. They had not acted for four days before.

The urine is acid; it contains biliary colouring matter, but no albumen; it deposits a considerable quantity of uric acid crystals, and contains a large quantity of urea (6 per cent.). Its sp. gr. is 1084.

March 26th.—Ordered a grain of opium three times a day.

April 3rd.—There has been but little change in his symptoms. The spasms return with about the same frequency, but with less severity. He has had no sickness nor nausea. His tongue is covered with a thick white fur. He "feels parched and dry, but not feverish."

During the attacks of spasm the coils of intestine become very evident, and there are loud gurgling sounds of fluid. The distension of the abdomen is almost limited to the region below the umbilicus. The whole abdomen is tympanitic, but (in the intervals between the spasms) in the left iliac region the percussion note is much higher pitched and more drummy than elsewhere. No tumour can be discovered.

Yesterday (April 2nd) Dr. Fagge examined the rectum and found it full of solid fæces. An enema of castor oil was therefore ordered. This brought away a large quantity (equal to at least two full motions) of solid well-formed fæces, *part* of which was pale and clay-coloured (? Is this the part which has been formed within the last few days, since he has been taking the opium). He had had no evacuation since the 27th. He had felt an inclination to go to stool each day, but had passed nothing but a little wind. He had passed but little wind at other times.

On April 3rd a large injection was administered, amounting to four pints. This gave a good deal of pain, and caused the stomach to swell up. Most of it returned again, coloured with fæcal matter.

Mr. Durham saw the case and examined the rectum. It was found to be dilated. On the left side in particular there was a transverse fold, round which the finger could be passed. A hard round swelling was felt in front of the bowel, behind the prostate. This remained after the bladder had been emptied by a catheter.

There is a remarkable freedom from anxiety in the countenance. He sleeps badly, waking up constantly with the pain.

Ordered a grain of Ext. belladonn., half a grain of Ext. op., and half a grain of calomel, every four hours.

On the 4th the castor-oil injection was repeated.

6th.—Since yesterday afternoon his vision has been somewhat impaired for near objects. He cannot read; he feels uncomfortable and light-headed, and has been slightly delirious; the motions are solid and rather narrow; the pains have

been rather less frequent, but to-day they recur at short intervals, and are very severe.

9th.—Ordered one third of a grain of morphia by subcutaneous injection twice a day.

16th.—Since the last report the abdominal pains have been somewhat less frequent and unaccompanied by gurglings. On the 10th the bowels were very freely opened, the evacuation being of normal colour. Since then the motions have been darker and of less firm consistence. He looks more anxious and depressed; he has no appetite; his tongue is loaded; he gets no sleep at night, although he has a subcutaneous injection of morphia; and this is therefore to be discontinued.

On carefully examining the abdomen Dr. Fagge thought he could feel a rounded tumour, when he pressed deeply below the umbilicus and a little to the left of it. The hard mass in front of the rectum was still plainly discoverable, and Dr. Fagge thought that he could feel this to be continuous with the tumour obscurely felt below the umbilicus.

20th.—Last night he suffered a good deal of pain, which returned every ten minutes. Since then he has been free from it. For the last four days the attacks of pain have been much less frequent, occurring not oftener than once in three quarters of an hour. The pupils are contracted. He sleeps well.

25th.—He has continued to improve, and to-day leaves the hospital for the seaside. For some days past he has sat up, whereas at one time he was confined to his bed. His countenance is much less anxious than it was, and the attacks of pain are much less frequent and severe. The improvement appears to be mainly attributable to regulation of the diet. He is allowed beef tea and bread and butter, but no solid meat nor vegetables.

Early in June he returned to his home, and on June 5th Dr. Fagge visited him there. He was greatly altered for the worse. His face was sunken and emaciated, and very anxious. There was obstinate constipation. Vomiting had come on, and the vomited matters had recently become stercoraceous. The abdomen was enormously distended.

On June 8th he died without any abatement of his symptoms having occurred.

On June 9th a post-mortem examination was made by Messrs. Goodhart and Wing, in the presence of Dr. Fagge. The following report was drawn up by Mr. Goodhart.

On opening the abdomen (which was greatly distended) a small quantity of fluid escaped.

The coils of the small intestine were very prominent, and were matted together, and also bound to the abdominal wall in places by recent lymph of a grey colour. Scattered over both the parietal and the visceral layers of the peritoneum were numerous small growths, rather larger than tubercles. These were of irregular shapes, and flattened at their summits. In many places they seemed to accompany the smaller vessels beneath the peritoneum.

The small intestine was much distended with gas and fluid. The latter, when disturbed, flowed about with a gurgling noise, exactly like that which had been so often heard during the patient's life. The principal seat of obstruction lay in the left iliac fossa, internal to the sigmoid flexure of the colon. At this spot several coils of the small intestine were bound down and matted together. When

they were unravelled, this was found to be due to a thickening and contraction of the mesentery, resulting from an enlargement of its substance and of the contained glands, which were occupied by a new growth of a grey colour, tough and fibrous in consistence. On section the growth was found to be made up of an opaque fibrous tissue, apparently dotted over with semitransparent gelatinous points. There was no juice when a cut gland was scraped.

At this spot the bowel was partly twisted, and its calibre was very much narrowed. It would not admit of the introduction of the little finger. On opening up the gut its mucous membrane was found to be invaded by a new growth over a space of about three inches in length. It consisted of nodules about the size of a pea, or smaller, which were white, soft, and juicy. There were valvulæ conniventes in the bowel both above and below the seat of obstruction. The intestine above it was much enlarged, and its muscular coat greatly thickened. Nearly the whole mesentery was filled with the same new growth, and in many places the gut was sharply bent on itself, round a gland projecting towards the interior of its canal. Under the microscope the growth in the bowel was found to have attacked the mucous and submucous tissues, leaving the muscular coat in most places untouched. Well-marked "cancer cells" existed in it.

The tumour which had been felt per rectum was found to consist of a mass of a similar material, chiefly composed of fibrous elements. At first it was supposed to occupy one of the vesiculæ seminales, but on closer dissection it seemed that this was not the case. These organs and the vasa deferentia were, however, imbedded in it.¹

The cæcum was full of scybala.

¹ In the volume of 'Post-mortem Records' for 1867, by Dr. Moxon, I find an instance of a very similar affection of the same parts, itself the substantive disease. The case is headed—

"Malignant disease about the vesiculæ seminales, extending to the lumbar glands."

"W. O—, æt. 40, admitted into Clinical Ward under Dr. Rees' care, November 4th, 1867. He had tumours in the right iliac region, and also in the left. He further had a tumour in the right axilla, and a 'glandular' tumour behind and beneath the right jaw. He died after two days' serious illness.

"Behind the bladder was a tumour about the vesiculæ seminales, reaching as low as the middle of the trigone, as high as one inch and a half above the orifices of the ureters. Its exterior did not at all correspond to the outlines of the vesiculæ, but was quite indefinite. It yielded milky juice on scraping its cut surface."

Another case, in its morbid anatomy very like that recorded in the text, is that of J. K—, æt. 38, admitted August 18th, 1865, under Dr. Barlow's care. He seems to have suffered mainly from ascites, for which paracentesis was performed, which set up fatal peritonitis.

On post-mortem examination the upper part of the small intestine was excessively distended. The omentum was three quarters of an inch thick. It, the mesenteric glands, and the parietal peritoneum were all invaded by cancerous growths. The stomach was also attacked by the disease, especially along its lesser curvature; and the liver contained numerous large cancerous masses.

Between the bladder and the rectum, and continuous with a mass that under-

The liver was not minutely examined, but it seemed to contain no cancerous or syphilitic deposit. The capsule was thin and natural, but at the portal fissure was a quantity of yellow fibrous material, of an unusual kind. The kidneys, spleen, testes and prostate were healthy.

A case very similar to that last recorded in its clinical history and morbid anatomy, but differing from it in that the chronic peritonitis which was present was not associated with cancer, was brought before the Pathological Society by Dr. Bristowe in the year 1857 ('*Path. Trans.*,' viii, p. 200). A man, æt. 40, suffered for ten weeks with symptoms of partial obstruction. His illness began "suddenly with severe colicky pain which bent him double." After a time the pain became constant, but with exacerbations, lasting two or three minutes, during which a gurgling sound was heard, and the peristaltic action could be seen. The small intestines from the middle of the ileum to within a foot of the cæcum were adherent and entangled together. There was no stricture; no part through which the finger could not readily be passed. Dr. Bristowe believed that the adhesions had been formed since the commencement of the patient's last illness; that this was, in fact, at first a partial peritonitis.

In Case 47 the primary affection was possibly seated in the mesenteric glands, drawing in the mesentery itself, and contracting the intestine. The cases which follow present a similar condition, but in a still more marked way, since in them the intestines were not at the same time matted together by any extensive peritonitis.

CASE 48.—*Contraction of mesentery, with old disease of its glands; adhesions of intestines together.*—C. S—, æt. 29, admitted into Stephen Ward under Dr. Rees' care, November 8th, 1861. He was a painter, and had a well-marked blue line on the gums. For about four years he had at times suffered from pains in the abdomen, with constipation and sickness. These symptoms had been supposed to be due to lead colic. Of late they had been much worse. He was very thin, and had constipation and frequent vomiting. His illness appeared to be too severe for mere lead colic, and therefore some organic mischief was suspected.

lay the peritoneum at the bottom of the recto-vesical pouch, was a peach-sized mass of hard carcinoma. In its neighbourhood the subperitoneal and pelvic cellular tissue was thickened.

At last the vomiting became constant, and the matters ejected stercoraceous. He died on November 20th.

On post-mortem examination there was universal acute peritonitis. The upper part of the abdomen was occupied by some distended small intestines, whilst in the lower part lay a coil of the remaining small intestine in a comparatively contracted state. This contracted coil consisted of several feet of the lower end of the ileum, and it was formed by a gathering together of the mesentery of the bowel of which it was made up, and by the fixing of this mesentery to a point over the last lumbar vertebra. The sides of the intestines were also united together on the mesenteric aspect. Leading from this a fibrous thickening extended upwards on to a coil of the intestine, and partially strangulated it. At the point of union of these parts a hard lump could be felt about the size of a walnut. On cutting through this it was found to consist of fibrous tissue, and to contain branches of the mesenteric artery and some rounded bodies, which appeared to be glands. It thus appeared tolerably evident that the disease had commenced in the mesentery, and probably in an affection of the mesenteric glands in infancy, and that, by subsequent contraction, the coils had become drawn together and united in the manner seen. On feeling the bowel itself, it was found to be hardened in such a way as to diminish the calibre of the gut to a greater extent than could be seen externally. This was due to a great hypertrophy of the muscular coat of the intestine, beneath which again was a dense white fibrous tissue. The mucous membrane here exhibited a small ulcer. The thickening of the coats exactly resembled that seen in scirrhus pylorus, but on a smaller scale. Above this point the walls of the intestine were considerably thickened for some distance.

CASE 49.*—*Enlargement of the mesenteric glands; contraction of the mesentery and intestines, with adhesions.*—J. A—, æt. about 16 or 17, admitted into the Clinical Ward under Dr. Back's care April 21st, 1830. He was thin and emaciated, and the abdomen much distended. He had been ill for a considerable time, and his malady was somewhat vaguely referred to a blow received about two years before on the lower part of the abdomen or in the perinæum. There was very sensible fluctuation, but a tympanitic sound on percussion. He had some vomiting of a material of a dirty-brown colour, which seemed to come from the intestines. He was reported to have passed loose motions, if not to have had some diarrhœa.

In the peritoneal cavity there was but little fluid effusion; there was no recent lymph, and there were only partial traces of old peritoneal inflammation. A considerable part of the small intestine was enormously dilated, being as large as a moderate-sized arm, whilst the large bowel was much reduced in size. The cause of this was found in a mass of rounded tubercles, in size from that of a pigeon's egg to a nut. These formed collectively a mass as large as a small fist, situated in the mesentery, close upon the intestines, and the surrounding inflammation, which appeared to have been long passed, had by contraction produced much puckering and shortening and thickening of the mesentery, and so complete a stricture of the intestine that scarce room was left for the passage of a small quill. The stricture was situated either very near to the termination of the jejunum, or high up in the ileum. The coats of the intestine were much thickened at the dilated part. The mucous membrane appeared healthy, but the

valvulae conniventes were nearly or quite lost. Near the termination of the ileum were one or two tumours, similar to those above mentioned, and there were partial adhesions and puckering with opacity of the peritoneum around them, but no apparent stricture of the intestine at that spot (v. Prep. 1819⁷⁰, 2459⁸⁰, 2459⁷⁰).

CASE 50.*—*Enlarged strumous glands in mesentery; narrowing of the calibre of the intestine.*—H. N—, æt. 19, admitted July 25th, 1850, under the care of Dr. Bird and Dr. Gull; he died on the following day.

There was general peritonitis. The intestines were in parts distended; the cæcum large and somewhat distended with gas; the colon empty. At about three feet from the cæcum a portion of the small intestine, not more than an inch in length, was pale, empty, and contracted. Above this point the bowel was filled with gas; below it was empty. Upon disturbing the relations of the parts, the gaseous contents readily passed through the contracted intestine, showing that its canal was not completely obstructed. Opposite the constricted point the mesentery contained a group of enlarged strumous glands, the largest the size of a walnut and filled with chalky matter. "It appeared as if these glands, more particularly the largest, had by their growth and increase drawn a portion of mesentery backwards to the spine, and thus, by expanding the two layers of the serous membrane, and widening the base of the peritoneal ligament, had acted like a broad ligature."

The next two cases are of rather doubtful nature; but appear to belong to this rather than to any other form of intestinal obstruction.

CASE 51.*—E. D—, admitted into Esther Ward under Mr. Key, October 23rd, 1845, and died on October 26th. She had had constipation since the 20th.

On opening the abdomen the omentum was found to be "lean," and adherent below the umbilicus. The arch of the colon was adherent to the fundus uteri, and the ovaries, &c., were wasted and much shut up by adhesions. A cord from one contracted broad ligament passed to the ileum, seventeen inches from the cæcum. It was one inch and a quarter long, as thick as a ductus arteriosus, red, loose, and strong. The intestines above were wide and fleshy, below contracted. The obstruction appeared to have been in part due to twist of the bowel. Peritoneum a good deal injected, bathed in scanty dull sanies.

(From the report of Dr. Moxon).

CASE 52.—Charles Alfred J—, æt. 7½, was admitted July 28th, 1865.

On post-mortem examination the body was considerably wasted. The colon and lower eighteen inches of the ileum were *contracted*. Above this the small intestine was very considerably *distended*, and it contained about six *concretions* of raw ochre colour, very friable, and of the size of beans. Five cherry-stones were also found in this part of the bowel. The walls of the distended part of the intestine were hypertrophied, and the peritoneum over them thickened.

The omentum was fixed on the convexity of a bend of the ileum, just at the spot where the vitelline duct passes into it in foetal life. At the point of fixation an ulcer was seen on the inner face of the bowel, which ulcer led into a conical

cavity, half an inch deep, projecting into the areolar tissue which connected the omentum with the bowel. Within six inches of the same spot there were also the black scars of two or three former ulcers. In the whole length of the alimentary canal no other ulcers existed.

In considering the symptoms and course of this form of intestinal obstruction,—which affects most commonly the *small* intestine,—it is especially to be noted that the group of “contractions” practically comprises all cases of *chronic* obstruction of that part of the bowel. In one or two of the cases detailed above, well-marked, although incomplete, stoppage of the contents of the gut took place for a long time before severe symptoms set in. Now, so far as I am aware, such an occurrence as this is entirely without parallel in that other important form of obstruction of the small intestine, in which the cause is a band, or a diverticulum, &c., strangulating the bowel from without. It might perhaps have been expected that in an “internal hernia,” as in an ordinary “external hernia,” the intestine might be simply “*incarcerated*,” but I cannot discover that such a condition is ever observed.

Hence there are cases belonging to the group now under consideration, in which I think the symptoms and course are such as would be presented by no other form of intestinal obstruction. Take, particularly, Case 47. A man is suffering from frequent attacks of severe abdominal pain, lasting a few minutes at a time, during which the intestines can be seen writhing and coiling, and a gurgling of fluid is heard. There is partial, but not absolute, constipation. There is neither sickness nor nausea. The abdomen is not much distended, and the regions of the colon are not prominent. Everything points to the small intestine as the seat of disease; and if true stricture be excluded on the ground of its rarity, we are fairly entitled to conclude that the case belongs to the class of “contractions.” The argument held during the patient’s life was, in fact, somewhat of this kind, and led those who saw the case to reject absolutely the idea that any operation could afford relief.

At the same time it is to be observed that all cases belonging to this group do not present such marked features. Take, for instance, Case 40, which was under Mr. Birkett’s care. When this girl was first admitted into the hospital, the symptoms,

although very marked, presented scarcely anything that could be regarded as characteristic of one form of obstruction, rather than another. In one respect, indeed, the history differed altogether from that ordinarily obtained in the cases now under consideration, and pointed rather to obstruction by a band, or some *strangulating* agent. She told us exactly on what day, and in what part of the day, she had been taken ill.

There was, however, a feature about this case which I think may, perhaps, hereafter be used as an aid towards the diagnosis of similar forms of disease. *Distinct peristaltic movements of the intestines were seen on the thirteenth day of her illness.* Now, it is well known that visible peristalsis not infrequently occurs in cases of intestinal obstruction; but, so far as I know, its conditions have never been investigated, and I think observers have rather assumed that it may occur in all forms alike. It certainly does not necessarily occur in all cases. In Case 64, *infra*, for instance, in which there was obstruction of the ileum by a band, I watched for it carefully, but was never able to observe it.

Every one is aware that in intestinal obstruction of long standing the bowel above the seat of obstruction becomes hypertrophied; and I think it may fairly be assumed that the movements of such hypertrophied coils of gut would be much more forcible, and therefore better marked on the surface, than those of an intestine of normal thickness. The presence of extreme visible peristalsis may thus perhaps be a sign that an obstruction, apparently acute, is really due to some chronic cause.¹

The point appears to me to be one of considerable importance, and one which well deserves to be noted in future cases. I do not know that it has yet been shown that the peristaltic movements of an *unhypertrophied* intestine can ever be seen through the abdominal parietes.

Now, in reading through the cases which have been described in the present part of this paper, one cannot but be struck with the frequency with which it is noted that the bowel was hyper-

¹ A case bearing upon this subject is quoted from Louis by Duchaussoy, op. cit., p. 313. A woman was ill for two months and a half with *incomplete* obstruction. *In the attacks of pain the coils of bowel were plainly visible.* The lower end of the ileum was adherent to the uterus, and formed two or three bends, adherent to one another. The muscular coat of the intestine above was greatly hypertrophied.

trophied: and I may state that since my attention has been drawn to this subject, I have found that whenever well-marked peristalsis was visible, the disease belonged to one of the two main varieties of *chronic* intestinal obstruction, being either a "stricture," or one of the several forms of "contractions." At the same time, I should be quite prepared to find both peristalsis and hypertrophy in a case in which repeated attacks of obstruction had occurred from a coil of intestine again and again slipping under a band or diverticulum.

With regard to the differences which might distinguish "contraction" of the *large*, from that of the *small* intestine, I have very little to say.

There is no *strangulation* of the bowel in these forms of disease. Hence, if the rules laid down in the early part of this paper be correct, we must not expect early severe collapse, or suppression of urine, to occur in any case of this kind, however high in the intestine the lesion may be. Thus, whatever the seat, if the obstruction be *total*, the symptoms will probably generally be rather of a *negative* kind; sufficient to prove the existence of an obstruction, but throwing little light on its nature. The chief differences must be looked for in the form of the abdomen, and in the degree and rapidity of its distension; and the remarks already made as to the caution necessary in drawing conclusions from these circumstances apply with especial force to the class of cases with which we are now concerned.

V. FOLDS AND TWISTS OF THE INTESTINE; VOLVULI.

Under this heading I place all those cases in which an obstruction is due neither to plugging from within, nor to an invagination, nor to an interstitial growth, nor to an adhesion and consequent contraction by lymph or other new formation, nor, lastly, to constriction from without,—but simply to a folding or twisting of the bowel upon itself, so that its calibre is closed by the pressure of a part of the intestine more or less directly continuous with it, or by that of its mesentery.

In the definition just given it is stated that the obstruction in the cases now under consideration is due *simply* to the folding or twisting of the intestine. For, as has been pointed out by Mr. Hilton, and as I have already had occasion to remark,

it is probable that in many cases of *stricture* the ultimate complete obstruction is directly caused, not so much by the stricture itself, as by the gradual folding on itself of the bowel above.

Again, although for convenience of classification I have placed together simple folds of the bowel and twists or *volvuli*, it is yet evident that an important distinction exists between these two classes of cases. In the latter, the mesentery of the part affected is subject to violent torsion, and consequently not only does it often become itself inflamed, but the bowel which is served by it may also inflame and become gangrenous. It is true that this need not necessarily occur; and thus we find *volvuli* presenting perhaps a wider range in the degree of intensity and severity of their symptoms than any other form of intestinal obstruction.

I will take, first, a case in which the descending colon became obstructed, apparently by bending into a fold above a slight edge of peritoneum, which crossed its surface transversely, but which could hardly have directly constricted it.

(Reported by Mr. R. B. Hogg.)

CASE 53.—Samuel P—, æt. 48, admitted into Philip Ward under Dr. Rees' care on June 30th, 1867. For the last year he has not been well, having been in the habit of bringing up his breakfast. His present symptoms date from a week ago (Sunday, June 23rd). On that day he was walking in the Strand, when he felt a "working movement in the bowels, with no particular pain." When he got home to Walworth he had pain in the whole abdomen, and was suddenly purged two or three times, but was not sick. These symptoms passed off, and he went to church in the afternoon; but in the evening he was again seized with sharp pains, extending from the back (especially on the left side) round to the abdomen. The pains have continued up to the present time, and he has had frequent vomiting after taking anything into his stomach. For three days after the commencement of his symptoms, the bowels were constipated. His medical attendant then (June 26th) gave him some aperient medicine. As this did not operate, he afterwards took a dose of castor oil, and then another dose. The effect of this was, that for twenty-four hours he was very much purged. His wife thinks his bowels acted twenty times. The motions were very fluid, and were of a reddish tinge, but were not observed to contain blood. Since the 28th (two days before admission) the bowels have not acted. On the 28th and 29th he voided very little urine, but on the 30th he passed a large quantity. From 6 p.m. on the 30th to noon on the 1st July he has only micturated once, and then only about three ounces.

The report, taken on July 1st, goes on—"He has a very anxious countenance. The tongue is white. The pulse rather small and hard. He can keep down

milk, but has brought up some beef tea which he had taken. He eructates occasionally, but does not complain of any disagreeable taste. The abdomen is large, and generally tympanitic. The coils of intestine can be seen, but no vermicular movements. There is a transverse ridge below the epigastrium, as if the colon were distended. No dulness is to be made out at any part, and no tumour is discoverable. The chief seats of tenderness appear to be the epigastrium, the right iliac region, and the left loin."

He was ordered to have milk and ice to suck; and to take a grain of opium every four hours.

On July 2nd his countenance was less anxious; his pulse 84, still hard, but fuller. He had not again vomited, but had retched slightly. He had passed nearly three quarters of a chamber-vessel of urine last night and a smaller quantity in the morning. He did not complain of much pain, and the abdomen was less tender.

On July 3rd he was seen by Mr. Cooper Forster, who examined the rectum, and found some resistance on the right side. Mr. Forster ordered him to have a large injection of three pints of warm water.

On July 5th he was still much distressed, with great anxiety of countenance. He had vomited a small quantity of acid fluid. Pulse 104. It appeared to me that there was distinct fluctuation in the lower part of the abdomen. The distension was much as it had been for some days past.

On July 6th the abdomen was still as large, if not larger. Yesterday three pints, two ounces of warm water were injected. It was thought that there was still distinct fluctuation at the lower part of the abdomen. Ordered to continue the opium in grain-doses every three hours; turpentine stupes to be applied to the abdomen; an enema terebinthinæ to be administered.

He died on July 7th at 7.15 p.m., a fortnight from the commencement of his symptoms.

The post-mortem examination was made by Dr. Moxon. There was recent peritonitis, deep red lines and a little lymph marking the spaces where the intestines meet one another and the abdominal wall. The whole length of the small intestine was enormously distended, and so were the cæcum and the colon, as far as a line two inches below the lower end of the spleen, where the distension suddenly ceased, the descending colon beyond being quite narrow. Here a band of peritoneum passed in front of the gut, and seemed to tie it down to the posterior wall of the abdomen. This band had much the appearance and form of the fold of peritoneum on which the spleen normally rests, the "*shelf* of the spleen." An unusual tightness of this band was all that Dr. Moxon could affirm to exist in the present case. "It seems," he remarks, "almost impossible that such a trifling cause could give rise to the mischief, but this it undoubtedly did." Not only did the distension terminate at this spot, but the mucous membrane for a space of two inches was of a deep livid purple hue, the colour being centred opposite the band. The weight of the distended bowel above must have bent it downwards over the cord, and so tightened it.

The next case is one to which I have already referred in the early part of this paper. It presented many of those features which are generally supposed to indicate "obstruction high

up," but which, as I have endeavoured to show, really point rather to the *cause* of the disease, as being of a violent kind, strangulating the bowel, as well as obstructing it.

(From the Report of Mr. COLSON.)

CASE 54.—E. E., æt. 27, admitted into the Clinical Ward under Dr. Rees' care, October 7th, 1868. She has always had good health, and her bowels have acted regularly. On October 3rd she got wet, and sat down to supper without changing her clothes. On the following morning (Oct. 4th) she passed a small motion with great pain and difficulty. From that day to the night before her admission she has been constantly retching, but has not vomited anything, except some tea and some brandy, which came up as soon as she took them. She has also had a continual pain, worse at some times than at others. Last night the medical man who was in attendance upon her passed a catheter, but drew off only a little bloody liquid. She has had nothing to eat since the 4th, having taken only a cup of tea during the interval.

On her admission, at 8 p.m. on the 7th, she was ordered to take a grain of opium. About midnight she passed about two ounces and a half of water with great difficulty. It was high-coloured, of sp. gr. 1020; it contained no blood nor albumen.

8th, 11 a.m.—She has an anxious expression, her skin is cold and clammy, her tongue brown and furred, her pulse very quick and in fact almost imperceptible, her respiration hurried. The abdomen is immensely swollen, tense, and extremely hard. There is tympanitic resonance as high as the nipple on either side. She complains of pain along the course of the descending colon. The abdomen is tender, but she can bear a certain amount of pressure. The pain in the abdomen comes on in paroxysms; she describes it as a feeling of constriction round the middle of the belly.

About midway between the umbilicus and the ensiform cartilage is a transverse depression, above which is a roll which looks very like a distended transverse colon. No hernia can be detected.

In the afternoon Mr. Cooper Forster saw the case. He remarked that he had never felt an abdomen so tight. She was quite conscious, but much collapsed, the hands being very cold and the pulse extremely feeble. She had not been sick since her admission, but said that she would be sick if she drank anything.

She was ordered a little brandy and a grain of opium at once. She died at 5.15 p.m., having been ill only four days.

The report of the post-mortem examination is by Dr. Moxon.

On opening the abdomen nothing was seen but the colon. The cæcum was very large, and the ascending colon likewise. The hepatic flexure was patulous. The transverse colon was very wide and descended in an angular loop downwards to the pubes. After re-ascending it passed behind the sigmoid flexure (which, as will be seen, itself passed upwards into the left hypochondrium), and was also overlaid by the small intestines, which here only came forwards. This was the only part of the colon which was out of view. The descending colon suddenly terminated by going behind a twisted band, and then reappeared as a great distended blackish-purple inflamed loop of bowel that ran up into the left hypochondrium, between the liver and the spleen, and in front of the stomach; the dis-

placed bowel had therefore nothing but the diaphragm between it and the thoracic organs, which it pushed forcibly upwards. The blackened mass could be seen when the abdomen was first opened, lying between the ascending part of the transverse colon on the right, and the small intestines, which it thrust away to the left. It was adherent to the adjacent parts by recent plastic lymph. It ended below in a twist, passing into the rectum, which was pale and natural, though short. The fact turned out to be that the projecting loop which forms the sigmoid flexure had become twisted at its root, so that the proximal end of the loop passed round, first behind and to the right, and finally in front and to the left, of the distal end of it, the winding round being effected in a proportionately smaller space than is represented in the diagram appended to Dr. Moxon's report. When the volvulus was gently untwisted, it did not remain so, but sprang back at once into its abnormal position.

The next two cases are not very unlike that just recorded, except that the seat of the volvulus was the cæcum, instead of the sigmoid flexure.

CASE 55.—*Volvulus of the cæcum*.—D. O'C—, æt. 30, was admitted on October 11th, 1859, into Petersham Ward. The history of the case was obscure, the man being in a dying state when admitted. He stated that he had been quite well until three days before his admission, when he ate a quantity of pork, and his bowels became confined, and had not since been opened. To questions as to whether he had had habitual constipation he gave various replies, but it at least appeared that he had not suffered with his bowels sufficiently to fix his attention. When he was admitted his extremities were cold, and he was pulseless, and his abdomen much distended and tympanitic. It seemed tolerably clear that the obstruction was low down in the intestine, and this was confirmed by the circumstance that an elastic tube could be passed only for a few inches. It was not considered advisable to attempt to open the colon in the loin, as the seat of obstruction was so uncertain. As it was impossible that the man could live long it was proposed to prick the abdomen with needles, to see if any peristaltic action could be excited, or if any gas could be removed. As this operation produced no effect, a very fine exploratory trocar was thrust in. A quantity of gas escaped, which gave the man much relief. Afterwards a little fluid fæcal matter passed through the canula, which was fixed in, and was not removed until after death. He lived much longer than had been expected, but he never rallied, his limbs remaining cold, and his pulse being imperceptible. He died fifteen hours after his admission.

The post-mortem examination was made by Dr. Wilks.

When the abdomen was opened the cæcum was seen to be immensely distended, occupying the centre and upper part of the abdominal cavity, and filling nearly half of it. The bowel was black, being tightly constricted below by a twist on itself. About half a foot of the lower end of the ileum was also black, having been strangulated with it. When the cæcum was lifted up it was found to be quite free, but it could not be replaced in its natural position, which was occupied by other parts of the bowels. The cæcum passed into the ascending colon in the right hypochondrium. From this the transverse colon (which was much contracted) ran to the left hypochondrium, passing beneath the cæcum in its course. The descending colon ran

downwards for a few inches, and then passed across the spine to the right loin. Thus the sigmoid flexure lay in the ordinary position of the cæcum, and descended from the right side to form the rectum. The left kidney was misplaced, lying over the sacrum and the sacro-iliac synchondrosis, with its hilum upwards. Thus the left loin was quite empty.

As has already been stated, the lower end of the ileum was included in the twist made by the cæcum and was quite black, the constriction being very tight. The rest of the small intestines were distended, but there was no peritonitis. The interior of the constricted part was dark-coloured and contained extravasated blood; and its mucous membrane, especially in the ileum, was destroyed in places and had here and there a patch of adherent lymph upon it. The trocar had punctured the distended cæcum, but had done no injury. No extravasation of fæces had taken place.

CASE 56. (Reported by Mr. W. TOULMIN.)—T. P., æt. 41, admitted into the Clinical Ward under Dr. Habershon's care, December 11th, 1867. There was some doubt as to the history of the case, as the patient's account differed from that given by his wife. The man himself stated that he had been quite well until some time (two weeks ?) before his admission, when a doctor gave him a purgative. He also said that he had had pills and injections, but that his bowels had been open until four days before admission. His wife declared that he had not been right in his bowels for a long time, that they had been tolerably freely open at the onset of his illness, but that they had not acted for the last nine or ten days.

On admission he looked pale and ill. The abdomen was immensely distended, and universally tympanitic; there was but little pain or tenderness over it. It was pyriform in shape, and most distended immediately below the ribs. Lower down there was a depression indicating the interval between two portions of intestine. On the finger being introduced into the rectum no obstruction could be felt; the bowel contained some fæces. Mr. Stocker saw him, and prescribed *Ol. Crotonis* miss statim, et rep. 4tis horis; *Opii* gr. j, *Calomelanos* gr. j, 6tis horis.

In the night he was quite delirious and got out of bed. On December 12th he was more drowsy than before. On account of his difficulty of breathing a small trocar was thrust into the distended abdomen (into the "colon," the clinical clerk says), upon which some air and a thin serous fluid exuded. A catheter was passed, but the bladder was quite empty. Dr. Habershon saw him at 1 p.m., and prescribed *Opii* gr. j, *Ext. Belladonnæ* gr. ½, 4tis horis. Early in the morning he had had much vomiting, and threw up a large quantity of a yellowish or else blackish-brown fluid, which apparently had been in the small intestine. About 8.30 p.m. the vomiting became very violent and persistent, and he died at 10.30 p.m.

The post-mortem examination was made by Mr. Howse. On opening the abdomen nothing was seen but coils of small intestine, which were dilated to a diameter of two inches. These lay transversely, and somewhat resembled large intestine in appearance. When they were removed, the cæcum was found lying in the left hypochondrium, immensely dilated and somewhat thickened so as to look like a stomach. This led to the impression that there must be an intussusception of the ileum into it. The ileum was accordingly tied, and the ascending

colon; and the part between these ligatures was removed. It was then found that there was no intussusception, but that the cæcum contained an enormous quantity of fecal matter. Two fingers passed readily through the ileo-cæcal valve. The ascending colon was small and contracted above the point where it had been ligatured. It, therefore, appeared that the constriction must have been caused by the bowel being twisted on itself. The meso-cæcum was very long.

There were numerous patches of ulceration in the cæcum. The whole of the ileum was ulcerated in patches. These patches generally corresponded with the transverse folds of the intestine, but one or two were oval, and in form resembled Peyerian glands. The ulceration became more intense towards the ileo-cæcal valve. About two inches from the valve there was a spot of perforation, about a line and a half in diameter. This was within a large ulcer. No extravasation of feces had taken place from it. Whether the trocar had entered the bowel at this part could not be made out. The extreme lower end of the ileum, when washed out, appeared to have been less stretched than that part which joined the jejunum.

The peritoneal surface of the whole of the small intestines was brownish in colour, and there were some flakes of lymph, especially between the coils.

CASE 57.—J. W. J., æt. 28, was admitted into Philip Ward under Dr. Addison's care, November 11th, 1857.

He stated that about six months before he had had a violent attack of vomiting, and again three months later; also that he had gradually been getting weaker, and losing the use of his legs. The case was looked on as one of disease seated in the upper part of the spinal cord, both the legs and the arms being weak. A few days after his admission he had one of the attacks of vomiting of which he had spoken. He again rallied, but subsequently had other attacks. At length the sickness became more or less permanent; and it was his most urgent symptom, and that for which he was treated. During the last three weeks of his life he was much worse, and he died on March 11th, 1858, after four months' residence in the hospital.

The post-mortem examination was made by Dr. Wilks. The abdomen was not distended, but of ordinary size. The peritoneal cavity contained a quantity of fluid purulent matter, which occupied the spaces between the coils of small intestines, but did not reach up to the liver, being cut off from it by exudation fixing the stomach to that organ.

In the pelvis lay the cæcum, dilated into a great sac, in which there was a large rent, two or three inches long, so that it was collapsed. Its walls were very thin and slightly congested. The ascending colon passed directly upwards, parallel with the sigmoid flexure, from the cæcum to the splenic arch of the colon. The right loin was thus empty, both the ascending and the descending colon being on the left side of the abdomen. Where the cæcum was continuous with the ascending colon, it was partially twisted on its neck, and its weight, as it hung in the pelvis, must have affected the bowel above. But when it was lifted up and partially rolled over, it fell into a straight line with the colon; and it was therefore difficult to say whether there had been any twist during life. It seemed, however, that there must have been considerable impediment to the passage of fluid from such a depending sac into the colon, and this was confirmed

by the highly congested state of the parts. The cæcum was, in fact, of a chocolate hue, its serous surface slightly fissured and covered with lymph, and its mucous surface of an intense purple colour. The small intestines themselves were larger than the colon, but not extremely distended, a large part of their contents having passed into the peritoneum. The colon throughout was contracted and empty. The omentum passed from the left loin, as a strong band, and was adherent to the abdominal walls, near the pubes.

CASE 58.—E. S—, æt. 45, admitted into Lydia Ward under the care of Dr. Addison, November 9th, 1856. She stated that she had long suffered from constipation. A few days before her admission she began to suffer from symptoms of obstructed bowel, with vomiting, &c. Although the symptoms were not very urgent there was no relief from them. On admission an obscurely defined tumour was felt to the left side of the umbilicus, and the woman was evidently suffering from some impediment to the intestine. For a time she slightly improved, but the symptoms again became more violent. She never had a free passage from her bowels, although there was on two or three occasions a slight evacuation. She vomited frequently. On the 17th November the vomited matters had a fecal odour, and on and after the 22nd they were decidedly stercoraceous. From this it was thought probable that a communication existed between the stomach and the colon.

The post-mortem examination was made by Dr. Wilks.

The first thing that presented itself to notice was the remarkable displacement of the intestines, whereby the cæcum lay to the left of the umbilicus, upon the small intestines, which were placed beneath it. It was firmly fixed by old adhesions to the sigmoid flexure, and the omentum, which was altogether on the same side, was fixed to the same spot. The cæcum itself was enormously distended, being seven or eight inches long, and five or six inches broad. This large sac, however, probably included a considerable part of the ascending colon. At its upper part it became suddenly contracted, and this was the seat of the stricture, the intestine above (the rest of the ascending colon, and the transverse colon) being much contracted. The transverse colon joined the descending colon in its usual place, and passed down the left loin in the ordinary way. The colon, though contracted, out of place, and running a very tortuous course, was of about the usual length. The stricture above the cæcum appeared to be due simply to the twisting of the gut on itself, whereby it presented its back part to view, having fallen on its side. Upon opening the bowel and placing it straight, no constriction was seen, but the small size of the colon contrasted sharply with the distended state of the cæcum. The walls of the cæcum were thin, but healthy, with the exception of a small round opening in the front of it, which had set up fatal acute general peritonitis. The small intestines were of a red colour, were rather distended, and contained a brown feculent fluid, as did also the stomach. The duodenum also presented an abnormality; its descending portion made a remarkable flexure on itself before joining the jejunum.

Dr. Wilks adds that it was a question much discussed in the post-mortem room whether the position of the cæcum was due to a congenital misplacement or to a pathological act. The patient had stated that, when a girl, she had had jaundice and also inflammation of the inside. Some, therefore, supposed that the omentum had at that time become fixed to the sigmoid flexure and to the cæcum, and that

the latter had, by degrees, become dragged out of its position and attached to the former. "As, however, the cæcum was entirely surrounded by peritoneum, and the iliac fossa was also lined by a smooth serous membrane, it is more probable that the cæcum had been entirely free and loose from birth."

The great variety in the symptoms of volvulus is well illustrated by these cases. A careful perusal of them will, I think, fail to leave on the mind of the reader any combined impression which might serve to distinguish this class of cases, as a whole, from other forms of intestinal obstruction.

In the tenth volume of the 'Path. Trans.,' p. 153, however, Mr. Gay, in placing on record a case of "Fatal Obstruction, from Twisting of the Mesocolon," remarks that "the difficulty in recognising this source of obstruction during life is not so great as in the case of other forms." The points on which he relies as "sufficient to indicate the disorder" are, "the setting in of the final symptoms by diarrhœa, which does not always give way to complete obstruction, the slight vomiting, abundance of urine, and the left abdominal ridge of distended and tympanitic bowel." Among the cases just recorded the one which most nearly approaches to Mr. Gay's in its whole course and in its morbid anatomy is Case 54. In this, however, there was no premonitory diarrhœa, the urine was scanty, there was no more enlargement of the left side of the abdomen than of the right; and it seemed to those who watched the case that the comparative absence of vomiting was merely due to the fact that the girl instinctively avoided irritating her stomach, and swallowed absolutely nothing.

This case and that of Mr. Gay had, however, one feature in common: the rapidity with which they terminated in death. Mr. Gay's patient was attacked on the 10th November with diarrhœa, which ceased on the 12th. On the 13th he became occasionally sick; the abdomen was generally painful and tympanitic; and he died on the 15th. Dr. Rees' patient was taken ill on October 4th; and she died on the 8th. The most remarkable symptom in her case was the extreme and early distension of the abdomen. Mr. Forster observed that he had never felt so tense an abdomen. Now, this quite accords with a remark made by M. Duchaussoy, in treating of this form of intestinal obstruction, that "distension of the abdomen has generally come on rapidly, and has been carried to a very high

degree." In another place the same writer states that the "frequency of peritonitis is extremely remarkable" in such cases; and that it is usually developed within a very few days from the commencement of the disease.

It appears to me, indeed, that in the cases of Mr. Gay and Dr. Rees the rapidity and intensity of the symptoms were such as one can hardly find paralleled in any other form of obstruction of the bowels; and that if we are hereafter to distinguish this form of disease during the life of the patient, the safest grounds for our diagnosis will be found in these characters. I have already pointed out how entirely such cases of volvulus differ from the ordinary strictures of the large intestine in all their clinical features; and that in this respect they much more closely resemble cases of strangulation of the small intestine, except that their symptoms are even more acute.

In connection with Case 56, one of volvulus of the cæcum, in which that part of the intestine was bent upwards and lay deeply in the left hypochondrium, it may be interesting to refer to a specimen exhibited to the Pathological Society in the year 1850 by Mr. Avery. The patient from whom that specimen was taken had obstruction of the bowels, for which Amussat's operation was attempted on the *left* side. The descending colon was found to be empty, but a portion of greatly distended intestine appeared when the peritoneum had been opened. This was incised, and a large quantity of fœtid gas and some fæcal matter escaped. The bowel that had been opened turned to be the cæcum, which, with the ascending colon and the end of the ileum, was turned upside down and lay in the left lumbar region.

VI. INTERNAL STRANGULATION BY A BAND, DIVERTICULUM, APPENDIX, OR OTHER BODY INVESTED WITH PERITONEUM.

Under this heading I place together all those cases in which a knuckle or loop of the intestine is strangulated by a body unattached to the surface of the constricted part.

The seat of obstruction in these cases appears to be almost always the small intestine. To this rule I have met with no exception in our post-mortem records. It might indeed be expected that a part of the bowel so movable as the sigmoid

flexure should occasionally fall within the grasp of the bridles and other folds which are the constricting agents in the form of disease now under consideration. But the only instances of such an occurrence that I have read of are two by Duchaussoy, in which the sigmoid flexure was strangulated by the mesentery of a coil of intestine hanging down into the pelvis. In another case the mesentery is stated to have strangulated the ascending colon in a similar way. In two instances, again, a cæcal appendix is recorded as having constricted the ascending colon; and in one case the cæcum and its appendix, as well as the ileum, were strangulated by a *diverticulum*. It is evident that these exceptions are quite insignificant in so large a class of cases as that now under discussion.

In our post-mortem records I have found seventeen cases of *internal strangulation* of the intestine,—if I may use this term in its strictest sense to signify the form of obstruction with which we are now concerned. Thirteen of the seventeen cases have occurred since the commencement of the year 1854, from which year, as I have already stated, dates the commencement of the system of reporting all post-mortem examinations without selection.

In these seventeen cases the constricting agent was—

- (1.) In 5 cases a peritoneal band, generally connected at one extremity with the mesentery.
- (2.) In 3 cases a band derived from the omentum, or the margin of an aperture in that membrane.
- (3.) In 1 case an arch formed by the mesentery of a coil of ileum descending into the pelvis.
- (4.) In 1 case the pedicle of an ovarian tumour.
- (5.) In 1 case a band or bands connected with the vermiform appendix.
- (6.) In 5 cases a diverticulum from the ileum, with a band attached to its extremity.
- (7.) In 1 case the neck of an internal hernial pouch.

I. *Strangulation by peritoneal bands.*

CASE 59.—E. B—, æt. 52, admitted March 10th, 1857, under Dr. Addison's care. Twenty-one years before, when her last child was born, she had been very ill, and had been said to have inflammation of the womb. She had had good health, however, until six months ago, when she had what she called a bilious attack. She did not recover from this for a month, and had had pains in her abdomen

since. For three weeks the bowels had been costive, and during the last week there had been complete obstruction, with vomiting and the usual other symptoms.

She lived seven days after her admission, during which time she had constant vomiting; but the abdomen was only slightly distended. She was treated with opium.

The post-mortem examination was made by Dr. Wilks.

The abdomen was only slightly more distended and tympanitic than is natural. Upon opening its cavity the small intestines were seen to be rather distended, the large rather contracted. The whole of the serous surface had a greasy feel, and the coats of the bowel were injected and very lacerable from a general peritonitis. Within the pelvis lay several coils of small intestine, of a dark purple or black colour, firmly united to one another by effused lymph, and also to the abdominal walls in front. Upon lifting up some of the other coils of intestine, the cause of the strangulation was at once seen to be a band of adhesion passing from the sigmoid flexure to be attached to the peritoneum covering the posterior abdominal wall near the promontory of the sacrum. It was a tough flat band, about one and a half inch long, and half an inch wide. Nothing but the knife could have divided it. The hole beneath it would admit two fingers, and through it had passed two and a half feet of the ileum, the part of the gut strangulated being four feet above the ileo-cæcal valve. It was almost gangrenous, and its walls gave way on handling. At the points of strangulation the mucous membrane was deeply ulcerated. The small intestine below the constriction was very much contracted; but the band had probably likewise obstructed the sigmoid flexure to some extent, for the whole of the colon above was filled with scybala.

CASE 60.—J. L—, æt. 15, was admitted on May 1st, 1861, into John Ward, under Dr. Wilks' care, suffering from peritoneal symptoms and excessively ill. He died on the following morning.

He had been in Job Ward during the previous December and January for peritonitis, with which he had been ill for a month before his admission. He had been actively treated. When he was admitted on that occasion, inflammatory action was still going on; the abdomen was tumid and hot; he was excessively wasted, and for some time his recovery was doubtful. The cause was supposed to have been an injury.

On post-mortem examination the peritoneum was found to contain a bloody fluid. About four feet of the lower end of the ileum were distended and of a dark colour, contrasting strongly with the pale hue of the rest of the intestine. The distended part had been constricted by a band of adhesion, passing from the sigmoid flexure to the mesentery of the ileum. The band formed a round and slender, but tough cord; and it was at once seen on opening the abdomen, so that it might easily have been divided if an operation had been performed. The omentum was adherent to the abdominal walls and to the sigmoid flexure, and several other adhesions existed at this part, the sigmoid flexure being coiled up and adherent to itself. The colon was much contracted.

CASE 61.—W. K—, æt. 21, was admitted into Clinical Ward under Dr. Gull, February 13th, 1866. About three weeks before he had begun to suffer from griping pains in the abdomen, but had neither diarrhœa nor constipation. A week later, on January 31st, after his customary breakfast, he returned to his work,

when he was seized with most intense pain in the hypogastric region, which "drew him double." He was taken home and put to bed. Neither on that morning nor ever since had he any relief from his bowels, though enemata brought away scybalous masses. During the first week in February he vomited much, last week not so much. He had been fed by enemata, and had taken opium. On admission his face was anxious; respiration entirely thoracic; "hepatic" odour of breath; abdomen hard and tympanitic; no hernia; pulse 120; respiration 30; he was restless with pain; lips dry and cracked; there was a glandular tumour behind the ear on the right side. He became insensible and cried out for some time before death. He passed a copious liquid black, offensive, stool into his bed.

The post-mortem examination was made by Dr. Moxon. The peritoneal cavity contained air and a large quantity of thin, dark, offensive liquid. The peritoneum was of a dirty grey colour, thickened and shaggy with lymph. The only part free from this condition was that covering the hinder three quarters of the diaphragmatic surface of the liver, which was protected by adhesions apparently of the same date as the rest. All the intestines were bound back to the hinder wall of the abdomen, and fixed by adhesions to one another, to the mesentery and to the omentum, which covered them in. Three or four of the interstices between the coils contained pus. Thus the intestines were not in contact with the anterior wall of the abdomen, which would have been dull on percussion, had it not been for the air in the peritoneal cavity. A bridle half an inch wide extended from the lower part of the transverse colon to the cæcum, midway between the valve and the appendix. It was a firmish cord, and attached only at its ends. To the left of it lay a coil of intestine, consisting of about eight inches of the lower end of the ileum, which were darker coloured than the rest, with thin coats, and small in calibre—conditions which contrasted sharply with the state of the bowel immediately above, which was dilated and with thickened coats. As all the intestine above the point indicated was distended, and all below contracted, it was assumed that the ilens (if any) had been due to the band above described. Another band passed over the lower end of the descending colon into the left iliac fossa; but it did not appear to have produced constriction, as the bowel above it was not distended.

The stomach on its anterior surface presented a perforating ulcer of about the size of a threepenny piece, about one third to a quarter of the way from the œsophagus to the pylorus. This ulcer appeared considerably larger on the mucous than on the serous surface of the stomach. On the under face of the left lobe of the liver was an eroded patch, corresponding exactly in size and shape with the gastric ulcer just described, whose base it doubtless had formed.

Dr. Moxon's supposition was that the original disease had been perforating ulcer of the stomach; that this had set up adhesive peritonitis, the ulcerated part having become adherent to the liver so early that no extravasation took place; that among the adhesions formed had been the band from the transverse colon to the cæcum, and that a coil of ileum had passed under this, giving rise to the symptoms of obstruction; that the vomiting and distension so produced caused a reopening of the gastric ulcer, and an escape of the stomach-contents into the peritoneal cavity; and perhaps, finally, that this relieved the distension of the bowel above the constriction, and so allowed of the withdrawal of the strangulated part. This would account for the large stool having been passed just before death,

and for the fact that the coil which seemed to have been constricted was found lying free in the abdominal cavity.

In the next case about two feet of intestine were strangulated by a band, and part of the strangulated bowel was contained within a hernial case.

CASE 62.—J. C—, æt. 48, admitted into Luke Ward, under Mr. Cock's care, May 2nd, 1854, with a large strangulated congenital hernia. On the following day Mr. Cock operated, about forty-four hours after the hernia had come down. The intestine was found perforated by a small ulcer. A portion of sponge was introduced into the wound, and the bowel was not returned. Bilious fluid passed through the opening. The patient seems to have gone on favorably. On the 6th flatus passed per rectum; and on the 16th solid fæces came by the natural passage. On the 27th, however, sudden collapse came on, and the case terminated fatally twenty-four hours later.

The post-mortem examination was made by Dr. Habershon.

A portion of the jejunum was adherent at the external abdominal ring, and along the inguinal canal. An aperture in the gut communicated with the external wound. *For about two feet above the hernia*, and for about three inches below, the jejunum was congested, and of a very deep colour. At the termination of the congested part was a band of adhesion passing from the ileum to the mesentery. Below this the intestine was empty and much contracted. In the abdomen there were also several old adhesions near the ring.

The occurrence of fatal strangulation by an internal band in a patient affected with external hernia appears to be something more than a mere coincidence. Several examples of it are recorded in medical literature. Duchaussoy quotes¹ a case of Dupuytren's, in which a band passing from the bottom of the sac of an old inguinal hernia to the sigmoid flexure strangulated a coil of intestine. The same writer also cites two cases by Renoult and Monro respectively, in which a cord from the omentum caused fatal strangulation in patients affected with hernia. Mr. Bryant has recently² described two cases of a similar kind. One is that of a patient who had had a right inguinal hernia for twenty-five years. He was attacked with symptoms of strangulation on December 28th, 1866. He complained of fixed pain to the right of the umbilicus, with paroxysms of increased severity. On December 31st, Mr. Bryant explored the hernia, and after enlarging his incision discovered a band within the abdomen, which constricted the intestine. This was divided with scissors, and the patient re-

¹ Op. cit., p. 308.

² 'Med.-Chir. Trans.,' vol. 1, 1867, p. 65.

covered. Mr. Bryant's other case was very similar; herniotomy was performed, but death occurred on the fourth day. I accompanied Mr. Bryant to the post-mortem examination. Some feet of the middle of the small intestines were strangulated by a band passing from the intestine to the mesentery.

The tendency to the formation of internal bands in patients affected with hernia would, perhaps, if established, be a point of some importance, as encouraging the surgeon to push an exploratory operation in a case of doubtful strangulation further than he would otherwise venture to carry it. But it must be borne in mind that this is not the only morbid change to which the bowel is liable in cases of long-standing hernia. Within the last few weeks we have had in the post-mortem room a case in which hernia existed, and in which two or three coils of bowel were matted together, forming a little mass which had doubtless at one time lain within the hernial sac. The instances given under Section IV suffice to show that conditions of this kind may lead to obstruction of the bowel. Hence we are not justified in inferring from the fact that a patient suffering from obstruction has had an old hernia, that the cause of strangulation must needs be a band capable of being cut with a knife.

In the following case, again, a hernia existed; but the post-mortem report leaves doubtful the precise nature of the lesion which gave rise to the obstruction.

CASE 63*.—T. C—, æt. 50, a patient of Mr. Cooper's in Stephen Ward. On post-mortem examination, May 7th, 1851, there was general peritonitis. About three feet above the cæcum the ileum was "twisted on itself, and looped by an old adhesion to the spine, and also to another coil of intestine." The strangulated bowel was much inflamed, and perforated by an ulcer. There was in the left ring an old hernial sac, containing adherent omentum, but no intestine.

The next case, which Mr. Birkett has kindly furnished to me, is an illustration of the fact that a local peritonitis, matting the bowels together, may cause fatal obstruction after strangulated hernia; although one does not see very clearly how the inflammation was set up in the special parts affected by it.

CASE 64.—E. J. E. D—, æt. 38, admitted into Martha Ward under Mr. Birkett, July 2nd, 1864, suffering from a femoral hernia which had been strangulated 140 hours. She had neglected to send for a surgeon until the third day, when repeated taxis had been used. On admission she was in a state of great depression, with dry tongue, persistent fecoid vomiting, &c. Mr. Birkett at once operated. The

sac was found to be in a sloughing condition, and to contain offensive purulent serum and a single knuckle of intestine, which was leathery and covered with yellow adherent lymph. Her aspect was improved on the day after the operation, but in the evening she again had stercoraceous vomiting. The tympanitic distension of the abdomen also increased. On the second day she passed *per anum* about a pint of fluid, which was without any tinge of bile, and was probably the residue of injections. On the fourth day she aborted of a 2—3 month fœtus. On the tenth day "the peristaltic action of the intestines could be seen, and borborygmi plainly heard." On the twelfth day after the operation she died. On post-mortem examination the small intestines were greatly distended, and still more so the large intestine, with the exception of the sigmoid flexure and rectum, which were narrow. No peritonitis was observed until the pelvis was examined, when the coils of intestine lying in its cavity were found to be firmly united together. At the mouth of the hernial sac was a coil adherent, but pervious and in fact distended. On opening it there was no sign of its having been strangulated.

The obstruction was caused by the adhesions of the intestines within the pelvis and general want of tone. It was not caused by disease of any one part of the bowel.

2. *Strangulation by a band derived from the omentum or by the margin of a hole in its substance.*

CASE 65.—T. T—, æt. 45, was admitted into Stephen Ward under Dr. Habersham's care, November 5th, 1868. He had been taken ill on November 1st, with severe pain just above the umbilicus "gnawing and eating his inside out." This pain lasted that day and the next, and he was "nearly crazy" with it. The bowels were opened on November 1st; the motion being "black and long, but not larger than one's little finger." It could not be ascertained that there had been any constipation previously. On November 2nd he began to vomit, and on November 4th the vomited matters became stercoraceous. He says he has passed only a pint of urine since the 1st instant. Before coming to the hospital he took two doses of castor oil, two aperient pills, and two bottles of white mixture. He also had an injection.

On his admission, November 5th, he was seen by Mr. R. Stocker at 6 p.m., who made the following notes of his condition:—"His feet and hands were cold. Pulse 180, very feeble. Respiration 40. Tongue pale and moist. He complains of some pain on pressure to the left of and below the umbilicus. *The abdomen is flaccid.* After drinking some tea he was violently sick, the vomit smelling partly of tea, covered by a nasty stercoraceous odour. Examination *per rectum* yields negative results." At 10 p.m. he was somewhat less collapsed.

On November 6th I saw him in the morning, and made the following note:—"Hands still rather livid and cool. Abdomen quite supple, but rather full. Percussion-note higher-pitched on left, than on right side of abdomen. Transverse markings are visible on the surface, one a little to the left of the umbilicus, and one above it (? *lineæ transversæ* of rectus). No tumour can be felt. There is no visible peristalsis; nor can any coils of intestine be plainly seen." The treatment ordered consisted of a grain of opium every four hours with warm fomentations to the abdomen.

On November 7th he looked more comfortable, and he had had a tolerably good night. The pupils were rather contracted (from the opium?). The abdomen was still supple, and not decidedly tender. He had not had much pain, but some that morning. The vomited matters were of a bright yellow colour, but had no very marked faecal smell, being rather of a sickly and nauseous odour. The day before he had passed as much urine as would fill a conical glass, and in the night about the same quantity. Dr. Habershon saw him, and remarked that the case was evidently one of obstruction high up in the small intestine. He was ordered to continue the opium pills, and to have a nutrient injection three times a day.

On the following day, November 8th, I saw him in the morning. His face was sunken and he seemed almost moribund. There was still abundant vomiting of yellow fluid. He died at 8.30 p.m.

The post-mortem examination was made by Dr. Moxon. There were no signs of peritonitis. The bowels were, on the whole, little distended. The first ten feet of the small intestine, however, contained two and a quarter pints of a yellowish-brown liquid having an offensive, but questionably faecal odour. This part of the bowel occupied the middle regions of the abdomen, and descended into the pelvis, where it became strangulated by passing under an arch which was formed by a cord from the right end of the omentum, adhering to the mesentery near its intestinal edge. The constricted portion of the intestine measured nearly two feet six inches in length. It was very dark in appearance; its upper end was somewhat ill-defined; its lower extremity was sharply distinguished from the pale and very contracted intestine with which it was continuous. This extremity was distant about ten feet from the caecum. The ascending and descending colon were nearly empty. The transverse colon was distended with gas.

CASE 66.—E. J. T.—, *æt.* 27, admitted into Job Ward under Dr. Rees' care, October 11th, 1861. He stated that he had been quite well until the 9th October, in the middle of the day, when he had pain in the abdomen, soon followed by vomiting, constipation, and all the signs of strangulation of the intestine.

On admission it was clear that the obstruction was high up, the abdomen not being distended, and there being urgent vomiting, and almost entire suppression of urine. The symptoms remained unrelieved until his death on October 14th.

On strict inquiry it could not be learned that he had ever had any peritoneal inflammation or other illness. He had been employed as a porter at a draper's at Peckham.

On opening the abdomen two or three distended coils of intestine were seen almost filling its cavity. Above them was the contracted colon, and below, in the pelvis, a mass of contracted small intestine. The lower edge of the omentum terminated in two cords, which passed down and were adherent to the mesentery at the termination of the ileum in the caecum. It was thought that these two cords had probably been the side boundaries of the omentum, and the space between them a hole, which had gradually become larger, and through which the greater bulk of the small intestines had passed. The posterior cord had produced no pressure on the bowel, but the upper had strangulated it. This was no temporary constriction, for the intestine was marked by an indentation at the spot, and by a white band, as if the peritoneal coat was somewhat thickened. The seat of strangulation was about five feet distant from the duodenum. The distended part of the bowel above was partly filled with fluid.

In the case last recorded there was a doubt whether the constricting band was a prolongation from the omentum, or one border of a hole in it, which had become enlarged so as nearly to obliterate it. In the next case no such band existed, the cause of obstruction being simply the margin of such an aperture in the omentum.

CASE 67*.—J. D., æt. 45, was admitted under Mr. Cock's care December 3rd, 1847. He had been quite well until November 29th, and had not previously suffered from irregular action of the bowels. On that morning he alighted from a chaise, when he felt a sudden pain in the abdomen towards the right iliac region. About mid-day he began to vomit. On December 1st he was seen by Dr. Gull; he was moderately bled, and purgatives were administered, but without any effect. Opiates were subsequently used. When he was brought into the hospital tenderness of the abdomen was commencing. He was placed in a warm bath, and water was freely injected through a flexible tube. Whilst in the bath he became much worse. His symptoms had not previously been at all acute, but he now became collapsed and died five hours afterwards.

After death it was found that a loop of the ileum, about six inches distant from the cæcum, had passed through a ring in the omentum down into the pelvis, where it was fixed by recent adhesions. It did not appear that the intestine was entirely strangulated by the ring, for air could be blown along it. The coils above were greatly distended. There was general peritonitis, with effusion of a puriform fluid. A small perforation existed at one spot in the intestine, and extravasation of fecal matter had taken place from it. There was, however, no appearance of ulceration of the mucous surface at this spot; it looked as if a cut had been made with a knife, obliquely across the valvulæ conniventes. It was, therefore, supposed to have been due to laceration, during some muscular effort, of the coats of the intestine, already, perhaps, softened by inflammation.

3. *Strangulation by the mesentery.*

This form of intestinal obstruction perhaps needs some explanation. It is not that due to constriction of the intestine by a hole in the mesentery through which a knuckle passes. Such an accident may occur, and is very analogous to what took place in the case last recorded, where the bowel was strangulated by a hole in the *omentum*. According to Duchaussoy, indeed, the former occurrence is more common than the latter in the proportion of eleven cases to two; but it so happens that I have found in our records no example of strangulation by a foramen in the mesentery, although I have been able to cite at least one instance in which obstruction was due to such a foramen in the omentum.

The affection now under consideration, however, is of a

different kind. It is that in which a coil of the small intestine hangs down into the pelvis, so that its mesentery forms an arch, beneath which another portion of the bowel slips. Duchaussoy refers to seven cases of this kind. In four of these the part strangulated belonged to the small intestine; but in two of them it was the sigmoid flexure, and in one the ascending colon. As I have already remarked, this is perhaps the only form of *true strangulation* to which the large intestine is liable.

In the case which I have to quote, however, and which was in many respects an exceptional one, the part constricted belonged to the jejunum.

CASE 68.—E. A—, æt. 39, admitted into Mary Ward under Dr. Hicks, and died on October 12th, 1866.

The abdomen contained a tumour the size of a child's head, which turned out to be an extra-uterine foetation. To the back of this a coil of ileum had become firmly fixed by old adhesions. The mesentery of this part of the ileum passed down across a coil of the jejunum, which was compressed by it in such a way as to close its calibre. The exact way in which the constriction of the bowel was effected may be difficult to express in words, but it is admirably shown in the drawing which Dr. Moxon has appended to his report. That the strangulation was complete was evident from the inordinate distension of the jejunum immediately above, whereas that below was quite empty, and not larger than one's little finger. It was thought that the tension of the arch constricting the bowel had been gradually increased by the accumulation of a large quantity of blood round the foetus, and the consequent thrusting down of the adherent loop of ileum into the pelvis. The colon was full of hardish scybala; the rectum was compressed by the tumour. There was recent peritonitis, the serous membrane being everywhere of a dark slate colour, and its cavity containing lymph and a small quantity of reddish grumous blood.

4. *Strangulation by the pedicle of an ovarian tumour.*

This cause of constriction is one which is very similar to, and seems naturally to follow, that which precedes it,—strangulation by an arch of the mesentery.

CASE 69.—Nancy H—, æt. 74, admitted on January 22nd, 1868, suffering from a tumour in the abdomen. She stated that, a few days before, having walked a long distance, she had been seized with pain in the abdomen and sickness, and that she then found that the abdomen was swollen. She was certain that there had before been nothing the matter. There was evidently a cyst in the abdomen, and this was regarded as probably ovarian, the only difficulty being in the history. She was for a time better, and left the hospital. On March 18th she returned with all the symptoms of strangulated hernia. She still persisted in

her original story as to the sudden appearance of the tumour, and this made the case still more difficult. With these symptoms she died on March 24th.

The abdomen was filled with a large ovarian cyst, free from adhesions, except that it adhered to the parietes at one spot, and above to the omentum. On lifting up the tumour, which grew from the left ovary, a portion of the ileum was seen passing round its pedicle, towards its front, and lying in the pelvis. This part of the bowel had been strangulated, and was of a dark red colour, and distended with fluid matter. By moving the tumour on one side the displaced coil could easily be lifted out and restored to its natural position. It consisted of the lower end of the ileum, with the exception of the last four inches towards the cæcum, which were pale, empty, and contracted, the line between the two portions being well shown on the mucous surface. A few coils of the small intestine above the constricted part were distended, injected, and greasy on their exterior.

5. Strangulation by a band, or bands, connected with the vermiform appendix.

CASE 70.—A. M—, æt. 32, was admitted under the care of Dr. Gull into Mary Ward, December 17th, 1858. From her account it appeared that on the 13th she had been suddenly seized with all the symptoms of strangulated hernia. She was quite well until this attack, but had had a similar one some time before. She took large quantities of aperient medicine. On admission the abdomen was distended, but not so much so as when the large intestine is the part strangulated. It was, therefore, thought that the small intestine was the seat of the obstruction. She died on December 21st.

The post-mortem examination was made by Dr. Wilks.

The abdomen was moderately distended. When it was opened its surface was seen to be occupied by a few coils of small intestine, which were of a red colour, and in an early stage of inflammation. The colon was very contracted. The ascending colon and the cæcum were entirely surrounded by peritoneum. The ascending colon also lay out of its usual position, so that the kidney was plainly visible. The appendix, together with some fibrous bands, passed inwards, and these were firmly adherent to the mesentery, over the lower lumbar vertebræ. A loop was thus formed, beneath which rather more than four feet of the lower end of the ileum had passed. The strangulated coils were firmly united to one another by lymph, and lay as a black mass within the pelvis. Their mesentery was much indurated and thickened by blood effused into its substance. The stricture was formed by fibrous bands at the end of the appendix, and by others running at its side and on its under surface. The transverse colon was dragged down to the same spot, not by its omentum, but by the under surface of the bowel itself. There was, however, no tension on it in its then contracted state.

It is rather remarkable that this should have been the only instance I have met with, in searching through our post-mortem books, of strangulation by an appendix cæci. The museum contains several specimens of this kind. One of these (2508⁸⁰)

was taken from a patient of Dr. Habershon's and Mr. Pye Smith's, who had been ill for three weeks before her death, with symptoms of peritonitis rather than obstruction. The bowels acted, and there was no distension of the abdomen. There was a local peritonitis, binding coils of the ileum to the cæcum; and the appendix was adherent to the mesentery, forming a loop beneath which a coil of intestine passed. Another preparation (2508⁵⁰) is merely stated to have been taken from a patient of Mr. Callaway, sen.; and of a third (2508) there is no history whatever.

6. *Strangulation by a diverticulum from the ileum.*

It has long been known that, as an occasional "abnormality," a pouch may be found projecting from the ileum; and it is now many years since Meckel showed that such a pouch is the relic of a foetal structure, the duct of the umbilical vesicle. Monro had previously supposed that it arose by gradual elongation from the intestine within a hernial sac. Subsequently Mr. Wilkinson King wrote a paper on this subject in the first volume of the 2nd series of the 'Guy's Hospital Reports;' and Struthers devoted a chapter to it in his "Anatomical and Physiological Observations." Both these writers drew especial attention to the fact that the diverticulum always opens into the lower part of the ileum—Mr. King says "between ten and twenty inches from the cæcum."¹

Considering that obstruction of the intestine by a diverticulum is an accidental result of the presence of an abnormal foetal relic, itself not very common, one would be prepared to suppose that such a form of obstruction would be but rarely met with; and on finding that Duchaussoy (for instance) cites twenty-one cases, one might naturally conclude that these had been recorded *because they were exceptional*. Such, however, is not the case.

¹ This statement, however, is not altogether confirmed by observation. One of the preparations in our Museum (Prep. 1819⁴⁵) is a specimen of a diverticulum "54 inches distant from the cæcum." Another (1819⁵⁰) is distinctly stated to have been situated above the middle of the ileum. This diverticulum is as large as a hen's egg, and has an unusually rounded form, but it appears to possess all the intestinal coats, and therefore cannot be referred to the "*false diverticula*" of Struthers, which are mere protrusions from the bowel, and which he consequently admits to occur at all parts of its length.

In our post-mortem records at Guy's I have found at least five examples of fatal obstruction by diverticula; three of which have occurred within the last fifteen years, the period during which the whole pathological experience of the hospital has been systematically recorded.¹

One of the most interesting points in the history of diverticula is that they are far more common in the male than in the female sex. This fact has not (so far as I know) been mentioned by any writer except Duchaussoy, who gives as the result of his investigations sixteen males to three females. The experience at the hospital yields numbers even more striking, although smaller. The museum catalogue and the post-mortem records contain notes of ten cases in which diverticula were found post-mortem (some of them accidentally), and in which the sex of the patient is stated. Nine of these occurred in males; the only female being E. M. W—, Dr. Wilks' patient, whose case will be given below. I do not know whether any explanation of the fact could be found in an association of arrest of development in the vitelline duct, with those early changes which in the male foetus indicate that testes rather than ovaries are being developed in the abdomen. The preponderating liability of males to this form of disease must certainly in future be taken into account in diagnosis; and it is interesting that, according to Duchaussoy, strangulation by the caecal appendix is considerably more common in females than in males.² This latter fact is no doubt due to the frequency of peritonitis in the lower part of the abdomen in females, set up by disease of the internal genitalia, and leading to the formation of adhesions.

¹ To strangulate a coil of intestine is not the only accident that may happen to a diverticulum. Accumulation of faecal matter may take place in it, as in the caecal appendix, and it may inflame, become gangrenous, and so cause death. Or (as was shown by Mr. Wilkinson King) it may remain patent as far as the umbilicus, allowing faeces to be discharged through it, and giving rise to one form of faecal fistula in infancy. Even when it surrounds a coil of intestine it sometimes seems not so much to strangulate the bowel, as to be itself strangulated by the pressure of the neck of the coil, which causes it to become gangrenous—(Duchaussoy).

² On the other hand Dr. Crisp and Volz have stated ('Path. Trans.,' x, p. 152) that disease set up by extraneous bodies in the caecal appendix occurs most commonly in males: in the proportion of 29 males to 3 females, according to the former writer; of 17 males to 3 females, according to the latter.

As a rule, fatal obstruction by a diverticulum occurs in patients who are under 20.

The exact way in which a diverticulum causes strangulation varies in different instances. Sometimes it is adherent to the mesentery or to some other part, forming a loop beneath which the small intestine passes.

CASE 71.—William B—, æt. 17, was admitted into the Clinical Ward under Dr. Pavy's care in June, 1865. He had been taken ill with all the symptoms of obstructed bowel two days before, and was brought to the hospital in a dying state.

The post-mortem examination was made by Dr. Wilks.

A diverticulum from about two feet above the cæcum was found to be adherent to the upper face of the mesentery, and to be tightly strapped round the small intestine, nearly all of which had passed beneath the loop thus formed. The bowel was easily withdrawn. The seat of strangulation was the upper part of the jejunum. The intestine above was darkened and much distended. Its peritoneum stripped off too easily, carrying the muscular coat with it. There was recent peritonitis, but little lymph had been effused.

CASE 72*.—Charles S—, æt. 19, admitted under Dr. Barlow, July 29th, 1850 died on July 30th.

The peritoneum contained a quantity of sanguineous serous effusion, and flakes of lymph. About the three lowest feet of the ileum were strangulated by passing through a ring, and were almost in a state of gangrene. The ring was formed by a diverticulum, which arose by a narrow neck from the ileum about six inches from the ileo-cæcal valve, and which had a narrow cord passing from its fundus to the mesentery. The intestine above the strangulated part was distended.

The following case, which was under my own care, is of a very similar kind; it affords an example of the fact already noticed, that the pressure on the diverticulum itself often sets up inflammation and gangrene of it. The rule appears to be that it then sloughs away *from its intestinal attachment*, as would probably have occurred in this case had the boy lived a little longer.

(Reported by Mr. R. STEPHENS.)

CASE 73.—Edward G—, æt. 10, admitted into the Clinical Ward under Dr. Fagge's care, August 11th, 1867, suffering from intestinal obstruction. There was a greenish bruise of the skin over the right iliac fossa, and a little tenderness over the same spot. When first admitted the boy would give no explanation of this bruise, but two days later he admitted that on the 6th of August (five days before his admission) he had been playing with some boys at "jump backs," when he fell and struck himself in the right iliac region against some large stones. He did not, however, complain of pain or tenderness until the evening, when he said he felt sore at the bottom of his belly. He could not sleep, and kept continually vomiting all through the night. He had an aperient powder and afterwards some castor oil, but brought both up immediately. There was no evacuation

from the bowels from August 6th until the morning of his admission, when he passed a piece of *feces* "like a stick," one and a half inch long. He was continually sick.

On August 12th he complained of pain chiefly about the umbilicus; but there was more tenderness in the right iliac fossa than in the left. The abdomen was very much distended. A line could plainly be seen below the ensiform cartilage, indicating the position of a coil of intestine placed transversely. The percussion note was dull in the right iliac fossa, but tympanitic elsewhere. Countenance anxious. Pulse 108. Tongue clean.

He was ordered to take a grain of opium every four hours, and to have an enema of beef tea twice daily. After the second injection the bowels acted; the evacuation was a brown fluid, containing a small quantity of *fecal* matter. The vomited matters were acid, containing a large quantity of a greenish substance, looking like some vegetable matter.

On the 13th he was in much the same condition, but the whole of the lower part of the abdomen was now dull. The bruise was more marked than ever. He was ordered to continue the opium every six hours. Early the following morning the boy appeared to be dying, but he afterwards rallied somewhat. The vomited matters, which had before had a sweet nauseous smell, became yellow and stercoraceous on the evening of the 14th. On the 15th he died.

The post-mortem examination was made by Dr. Pye Smith.

The abdominal cavity was found to contain an ounce or so of fluid. There was local peritonitis, matting together the *cæcum* and the adjacent part of the ileum in the right iliac fossa. The intestines were united together by recent lymph, but could be separated by recent traction. At a little more than a foot from the termination of the small intestine in the *cæcum*, the ileum passed beneath a strong band, one and a half inch long, which stretched from the gut across to the mesentery. The gut emerged from under this band immediately before entering the *cæcum*. The band was formed by a diverticulum from the ileum, broad enough to admit a little finger at its blind extremity where it was adherent to the mesentery, but much narrower at its other end. It was softened and partly torn away from its origin, and was quite empty. The constricted part of the intestine was matted together with its mesentery, was of a dark slate colour and full of pulsaticeous light-brown *feces*. Its mucous membrane was deeply congested, with hæmorrhagic points, but not softened nor ulcerated. The small intestine above was distended with a light yellow fluid; the colon almost empty.

The following case differed from the previous ones in this, that the cord which completed the constricting ring was attached not to the fundus of the diverticulum, but to one side of it.

CASE 74*.—John L—, *æt.* 40, under Dr. Bright's care, in the Clinical Ward, December 9th, 1829. There was general peritonitis. The omentum was much contracted; and the mesentery shortened. The jejunum and about the upper half of the ileum were greatly distended; the remainder of the ileum was empty. This was produced by a firm rounded cord, which arose from a large diverticulum, and was inserted into the root of the mesentery (Preparation 1819⁸⁰). The diverticulum was about the size of a hen's egg, and *situated above the seat of constriction*.

The remaining case differed from those above recorded in this respect, that the diverticulum did not form part of a ring by which a portion of intestine was encircled, but simply passed to the umbilicus. Thus, the obstruction appeared to be due simply to its dragging on the part of the bowel into which it was inserted. A very similar case is recorded in the 'Pathological Transactions' (vol. vii, p. 205), by Mr. N. Ward. In it two loops of small intestine became twisted on themselves, and fell over a diverticulum proceeding to the linea alba, an inch below the umbilicus.

(From the post-mortem report by Dr. WILKS.)

CASE 75.—Elizabeth Maria W—, æt. 10, admitted into Esther Ward, under Dr. Wilks' care, August 13th, and died on August 15th. She had never had any symptoms of obstruction of the bowels until August 4th, when, after eating some gooseberries, she began to vomit. At this time there was slight evacuation from the bowels; but there have since been all the symptoms of obstruction, including faecal vomiting. Collapse at last came on; and also heat of abdomen and other symptoms of peritonitis.

There was acute peritonitis. On lifting up the parietes a band was seen passing from the umbilicus to the lower part of the ileum; and on separating the intestines it was found that the seat of constriction was at this spot, about a foot or a foot and a half above the cæcum. The intestine above was much distended; that below was contracted, coiled up, and lay hanging down towards the pelvis, so that the band had produced a greater drag upon it. The band on careful examination was found to be a diverticulum, and to be pervious as far as the umbilicus, when it terminated in a blind end. It would admit an ordinary lead pencil, and at its intestinal end was as large as the contracted bowel below it. On removing the parts a laceration occurred at the point where it was attached to the bowel; and faecal matter escaped. Probably this had commenced during life.

7. *Strangulation by the neck of the sac of an internal hernia.*

This form of disease (which must be distinguished from strangulation by the edge of an aperture in the omentum, mesentery, or in any other peritoneal fold) is among the rarest causes of intestinal obstruction. Duchaussoy mentions several varieties of internal hernia: meso-colic and intra-mesenteric hernia; epiploic hernia; intra-iliac hernia; retro-cæcal hernia; hernia of the broad ligament.

CASE 76.—The only case coming into this category which I have met with in our post-mortem records is that which was related by Mr. Cooper Forster in the tenth volume of these Reports, p. 143, and in which a knuckle of intestine was

constricted by the neck of a sac situated close to the upper border of the obturator membrane, but not passing through it.

8. *Strangulation by the margin of an aperture formed by injury or disease in the abdominal parietes or in some viscus.*

In the cases which come under this head the knuckle of intestine which protrudes has no peritoneal sac. They, therefore, have less resemblance to the cases belonging to the last group than to those above referred to, of strangulation by a foramen in the mesentery or omentum. They include, however, "*herniæ*" of intestine through the diaphragm, through a lacerated opening in the abdominal muscles, through a ruptured uterus, through a ruptured bladder, through a perforating ulcer in the rectum, &c. &c.

No instance of intestinal obstruction from any of these causes stands entered in our post-mortem records during the period over which my researches have extended.

Before attempting to sketch the features which belong to internal strangulation, as distinguished from other forms of intestinal obstruction, it may be well to consider a question which came before me for decision in one of the cases above related,—whether or not a blow or injury to the abdomen is likely to be the direct exciting cause of an internal strangulation, either by actually squeezing a knuckle of bowel beneath a loop lying ready to receive it, or by forcing more bowel beneath a loop already containing a coil of the gut, or again by altering the position of a coil previously caught, and so preventing its return. The *possibility* of such an occurrence is, I think, demonstrated by my case of Edward G—, in whom strangulation by a diverticulum appeared to be plainly set up by a fall, in which he struck his abdomen on a stone.

But, granting the *possibility* that when symptoms of obstruction of the intestine follow an injury, the obstruction may be due to a bridle or diverticulum, or some similar agent, we may still ask whether the same cause may not give rise equally to other forms of obstruction. This was in fact the main question which had to be solved clinically in the case of E. G—. Now we have already seen that an *intussusception* may be caused

by an external injury ; but then most cases of intussusception present characters of their own, which distinguish them from other kinds of stoppage of the bowels. The only recorded case which I have met with bearing upon this point is one recorded by Mr. Avery.¹

On the 18th of September, 1852, a heavy waggon passed over the lower part of the chest and the epigastrium of a man, *æt.* 45. He subsequently suffered much pain and disturbance in the belly, and on December 31st was admitted into Charing Cross Hospital. He complained of severe but not constant pain ; his abdomen was distended ; and he had "frequent violent spasmodic contractions of the intestines, which were seen through the parietes in knots, which in a few seconds subsided, whilst similar elevations presented in other parts of the abdomen." The bowels were sometimes loose, sometimes confined. He was several times attacked with stercoraceous vomiting and other signs of almost complete obstruction. He ultimately died of acute peritonitis eight weeks after his admission, and more than five months after the injury. A round cord, as large as the little finger, was found passing from the omentum to the free edge of a portion of the small intestine ; and just opposite to this attachment there was an irregular opening in the mesentery, as if torn, of which the edges had only recently healed. At this spot the calibre of the intestine itself was so contracted as scarcely to admit a crowquill. The mucous membrane for an inch above this contraction was entirely removed by ulceration ; the other coats were considerably thickened and amalgamated by inflammatory deposit for some distance upwards. Around the obstruction the coats of the bowel did not feel indurated ; but seemed as if they had been torn or separated, and as if lymph or blood had been effused and become organized. The cord above described, in its passage downwards, embraced the two extremities of a convolution so firmly as probably to have prevented the passage of anything through them. Hence, if any operation had been attempted, the surgeon would probably have contented himself with dividing the cord. But this would have left the real cause of obstruction untouched, and would necessarily have failed to give relief to the symptoms.

This case appears to prove that the mischief set up by a severe injury to the abdomen may be followed by inflammatory changes in the coats of the intestine itself, which changes after a time may cause obstruction. It will, however, be observed that the duration of Mr. Avery's case was very different from that in my case above referred to. The one patient lived five months after the injury, the other, only nine days. This seems to promise for future cases a means of distinction between the two conditions. It is also interesting to notice—as bearing upon a suggestion thrown out in an earlier part of this paper²—the indications afforded by peristaltic movements

¹ 'Transactions of the Path. Soc.,' vol. iv, p. 156.

² Vide p. 338.

of the intestines. In my patient the coils could be seen slightly mapped out, but no peristalsis was visible. In the account of Mr. Avery's more chronic case, a most graphic description is given of the violent spasmodic contractions of the intestines which were seen at intervals.

The attempt to distinguish from all other forms of intestinal obstruction that depending on bands, diverticula and other constricting agents external to the bowel, is of the more importance, because on the possibility of such distinctions being made rest the future prospects of the exploratory operation;—an operation which has long interested the enthusiasm of the more enterprising among surgeons, but which can hardly yet be said to have gained for itself a settled place among admissible surgical procedures. There are, indeed, those who would boldly cut down on an intussusception or a volvulus, in the hope of being able to pull out the one, or untwist the other. In either instance there may be something to be said for operative interference; but no such strong arguments can be used in its favour, as would exist in any case in which the presence of a constricting band should have been certainly determined.

Excluding for the present volvulus and intussusception from consideration, it may be said that it is especially in cases of "internal strangulation"—those comprised in the sixth class in this paper—that the surgeon may, with some prospect of success, perform an exploratory operation, and lay open the abdomen to search for the cause of obstruction of the bowels. And, in considering the matter, the first question that suggests itself is this:—

I. *What is the frequency of cases of "internal strangulation" as compared with that of other forms of obstruction of the bowels?* Now, according to our post-mortem records, there have been only seventeen cases of this kind out of a total of seventy-five cases of obstruction; or 22·5 per cent. If, in order to insure that our cases be unselected, we exclude all cases occurring before 1854, we have thirteen such cases out of fifty-one; or 25·5 per cent. The proportion given by Dr. Brinton is somewhat higher, 31½ per cent.; but this writer appears to have included, under the same head, all cases in which the obstruction was caused by bodies "external to the bowel;" and he

gives no separate account of those varieties which I have described under the heading of "Contractions." Of the cases last referred to, the number recorded above is sixteen, of which nine have occurred in the Hospital since the year 1854. The addition of these nine to our thirteen cases of internal strangulation would give a proportion of 43·1 per cent. for the two forms together; a proportion which is higher than Dr. Brinton's. But this, I think, illustrates a fallacy already referred to as probably underlying many of this writer's statistics. Cases of "Contractions" present fewer salient points than cases belonging to any other form of intestinal obstruction. Hence, it is probable that the small number of instances of this kind which have hitherto been recorded affords no measure of their real frequency. I have already more than once insisted on the fact that the figures derived from our post-mortem records are free from this source of error.

II. A further question that arises is—*Does experience show that in any considerable proportion of cases which come under the head of internal strangulation, the constricted bowel could be released during life by operation?* To that question the answer is, I think, fairly satisfactory, so far as it depends on the evidence afforded by our post-mortem examinations of fatal cases of this form of disease. There might, in many cases, have been no little difficulty in finding a band among the distended coils, at the base of which it lay. In other cases, especially where a diverticulum formed part of the strangulating ring, cutting it through might have exposed the patient to the dangers of fæcal extravasation, and to diminish this risk it would have been necessary to divide it as far back as possible.

But I believe that it will appear to any one reading over the accounts of the post-mortem examinations above recorded, in the cases numbered respectively 59, 60, 65—76, that there is nothing in these accounts to show that an operation must necessarily have failed. If, for the sake of argument, we imagine the surgeon, when considering the question of operating during the patient's life in these cases, to have been acquainted (as we are now acquainted) with the real cause of the obstruction, revealed by the autopsy, we may, I think, conclude that the knowledge would not have deterred him from undertaking the exploration of the abdomen. In case 75, indeed, the diverticu-

lum which constricted the bowel was patent up to the umbilicus, where it terminated. But even in this case a successful result might, perhaps, have been attained by ligaturing the diverticulum before dividing it; and the account of the post-mortem examination even suggests that it might have been possible to have lifted the constricted coils over the diverticulum, and to have relieved the symptoms without cutting it through at all. It is quite true that in most of the cases the reports of the inspections fail to tell us what might have been the difficulties or dangers of the attempt to release the bowel by operation. Nothing but personal investigations could give one the right to speak with authority on this point; and no one observer can have opportunities of personally investigating many cases of the kind. In Case 61 an exploratory operation must necessarily have failed, but in that case the conditions were very complicated. The reports of Cases 62 and 63 are so imperfect, that it is impossible to say what would have been the prospects of good results from an operation. The remaining case, Case 64, was not one of *internal strangulation* at all, and is mentioned in this section only because there was a hernia, as in Cases 62 and 63, which precede it.

I regard the facts derivable from our post-mortem records, then, as indicating no insurmountable obstacles to the success of an exploratory operation, in the great majority of the cases of true internal strangulation which are to be found in these records.

The questions next force themselves upon us:—III. *What are the symptoms belonging to cases of internal strangulation of the intestines?* IV. *How far are they constant?* and V. *How far are they characteristic?*

And here I must, in the first place, repeat a remark made in the early part of this paper, that although each *form* of intestinal obstruction has features of its own, which more or less distinguish it from the other *forms*, yet in many instances a *case* of stoppage of the bowels comes before us clinically under conditions which render it impossible to discover any such features; and that a *case* often seems even to present no such features, discoverable by the most inquiring and careful search of the physician, during the few days through which he may be able to watch his patient.

This remark, true of all the varieties of intestinal obstruction, is true likewise of *internal strangulation*. But there are, I think, a good many cases of constriction by bands, diverticula, &c., to which the remark in question does not apply; and which present symptoms very different from those of a mere stoppage of the bowels. The deficiencies in the clinical histories of many of the cases above recorded, render it impossible to say in what proportion such symptoms are met with.

The symptoms referred to are, I think, mainly the following:—The sudden and definite onset of the patient's illness; the occurrence of collapse at its commencement; the comparatively early age; the severity of the pain, which is generally referred to the umbilicus; besides certain negations, namely, the absence of external or of discoverable obturator hernia;¹ the absence of precursory symptoms and of visible peristalsis (such as occur in strictures and contractions); the absence of tumour, hæmorrhage, and dysenteric symptoms (such as are seen in intussusceptions); and the absence of that extreme intensity and rapidity which belong to the more acute forms of volvulus.

I have already admitted that the positive among these symptoms are not *constantly* present in cases of internal strangulation. Probably, all of them exist together in very few cases; and in some they are all absent.

This, however, evidently does not affect the value of such indications when they are present; and therefore it is a question of the utmost importance, *Are these symptoms characteristic?* Does their presence show that the case must be one of internal strangulation, and that it can be an instance of no other form of intestinal obstruction?

Now, the cases in which the symptoms belonging to internal strangulation are most closely simulated are undoubtedly those of acute volvulus of the large intestine with strangulation, and a few of the cases described under the title of "contractions." As to the former, their distinguishing features have been already

¹ In a case in which Mr. Hilton opened the abdomen, and found an obturator hernia ('Med.-Chir. Trans.,' xxxi, p. 333), no sign of the hernia could be discovered in the thigh, even after its presence had been made out by tracing the bowel to the thyroid foramen. The patient was tall and thin. Probably, therefore, the existence of an obturator hernia must be admitted as a possibility in all cases of internal strangulation.

given; and their recognition is the less important in practice because it may be thought that in volvulus an exploratory operation is justifiable, and even not unlikely to be attended with success. With cases of "contractions" it is very different. They are *par excellence* the cases in which an operation must necessarily fail, and this has been a main reason which has led me to endeavour to distinguish that form of disease from *internal strangulation* proper. Now, in the great majority of such cases the symptoms of the affection last named are wanting; but it must be admitted that in one or two instances of contractions (and particularly in Case 40, in which the invasion seems to have been quite sudden and definite) the symptoms were not a little like those of internal strangulation of the bowel.

Thus, at the present time it would certainly be going too far to assert that the features above described as belonging to the more marked cases of internal strangulation are characteristic of that affection. But my belief is that their presence does afford at least a strong presumption that the case is one of this kind. If we are called to see a patient, under thirty years of age, who has been suffering for four or five days with symptoms of obstructed bowel (constipation, vomiting of intestinal fluid, distension of the abdomen, and mapping out of coils on its surface), and who has collapse, scanty or suppressed urine, and severe pain, referred to the umbilicus or to the right iliac fossa, which pain came on suddenly at a definite time, perhaps after the patient had made some effort, or received a blow; if before this the patient had been quite healthy; if there be no peristalsis visible on the surface of the abdomen; if no tumour can be felt, and there has been no tenesmus nor intestinal hæmorrhage; and lastly, if the distension of the abdomen, although marked, be not excessive; under such circumstances we should be justified in maintaining that the case is one of internal strangulation, and in treating the case accordingly.

Such a combination of symptoms may be rare. Possibly it is not found in 1 per cent. of all cases of "stoppage of the bowels," taken promiscuously. But I think we should be prepared to meet it when it occurs. Probably, too, in many of the cases in which more or fewer of the characters above

referred to are absent, there may be enough to justify one in asserting the strong probability, or even in maintaining positively, that the disease is internal strangulation of the bowel. In Case 65, for instance, I believe that this opinion was expressed by the physician under whose care the patient was.

So far, therefore, the facts, when carefully considered, appear in favour of the performance of an exploratory operation in the cases, undoubtedly exceptional, which present the features above described. But there remains another question to be considered:—VI. *Does internal strangulation ever undergo spontaneous cure, whether by the slipping out of the strangulated bowel, or by the sloughing or rupture of the constricting band.* To this question I can give no very positive answer. It is certain that a good many patients do recover from well-marked intestinal obstruction; but in the immense majority of these cases the cause of the disease is obscure, and remains a mystery unsolved even after the patient has recovered. In Case 40, one of “contraction” of the ileum by cancerous disease, the obstruction subsided, and free faecal evacuations took place before death, which arose rather from exhaustion than from stoppage of the bowels. This case probably shows that recovery from that form of disease is possible. Something similar, indeed, occurred in Case 47, and it is well known that cases of obstruction are met with in which the symptoms alternately subside and reappear during many months. These, I believe, are generally cases of “contractions.”

The following case, which I have found in one of the older volumes of the ‘Post-mortem Records’ at the hospital, appears at least to show that recovery *may* take place spontaneously, or with only *medical* treatment, even in a case of *internal strangulation by a band*.

CASE 77*.—W. H.—, a middle-aged man, admitted with obstinate constipation and stercoraceous vomiting under Dr. Addison’s care. These symptoms gradually subsided. However, the patient did not recover health and strength, but appeared to be labouring under phthisis, of which he ultimately died. The appendix caeci was firmly bound down to the brim of the pelvis by adhesions, and near the same spot there was an adhesion of a coil of small intestine, by a very short bridle. Two other bridles were attached to other convolutions lying in the same part of the abdomen, but at a distance of some inches from the first in the course of the intestinal canal. One was very slender, and nearly a foot in length; it was fixed within the pelvis to the right of the bladder, near its cervix. The other was much

shorter. Any one of the three might have caused the symptoms of obstruction under which the patient had suffered when first admitted.

There still remains to be noticed a point on which a few words must be said. I have insisted on the fact that general shock or collapse is one of the most important symptoms of *internal strangulation*, as indicating that the stoppage of the bowels is due, not to any slow change in the coats of the intestine itself, but presumably to something constricting it from without. The collapse, then, is an evidence of severe local damage to the affected bowel. Might it not be argued that the surgeon who performs an exploratory operation will find the gut in such an unhealthy condition—congested, inflamed, perhaps gangrenous—that his patient will die even should the purpose of the operation be fulfilled? The answer to this question lies beyond the scope of a physician's observation. It must be determined by the aid of surgical experience in regard to strangulated hernia. I believe the rule in that disease is to give the patient the benefit of the chance, however bad the condition of the bowel may be supposed to be. And I see no reason why the same rule should not be applied to an internal strangulation, assuming the diagnosis to be equally decided and absolute.

From the tenor of the above remarks it will be inferred that I entertain a strong hope that the exploratory operation will hereafter be admitted as a legitimate procedure, and will be successfully practised in carefully selected, but no doubt exceptional, cases of *internal strangulation* of the intestine.

There are two other forms of obstruction of the bowels in which an exploratory operation has been proposed—*intussusception*, and *volvulus*.

Now, for intussusception there can, I think, be no doubt that the proper treatment is inflation. This plan was long since recommended by Mr. Gorham in the third volume of the first series of the 'Guy's Hospital Reports.' I have many times regretted that I did not carry it out in my case above recorded (Case 7), in which the intussusception was diagnosed at an unusually early period, before hæmorrhage or other symptoms of strangulation of the included portion of bowel came on.

But, supposing that in a case of intussusception inflation should fail, would the surgeon be right in cutting down upon the tumour, and endeavouring to pull out the invaginated bowel? Dr. Brinton answers this question decisively in the negative. "An operation ought not," he thinks, "to be mooted." The only instance that I know of in which it has been recently performed is in a case which Mr. Spencer Wells brought before the Pathological Society in the year 1863.¹ In that case the reduction of the invaginated mass was accomplished, but only with great difficulty. The child, which was four months old, was in a dying state when the operation was commenced; it continued to sink, and died five hours afterwards. This case at any rate shows the possibility of withdrawing an intussusception of the large intestine, and is so far confirmatory of the remark made by MM. Barthez and Rilliet, who speak of the included portion as being very easily drawn out on post-mortem examination—"so easily that one almost regrets not having attempted to do the same thing during life."²

M. Duchaussoy³ recommends for ileo-cæcal invaginations the formation of an artificial anus through the front of the abdomen, or, as he terms it, "*enterotomy*." In this he follows MM. Nélaton and Denonvilliers. For intussusception of the small intestine he advises "*gastrotomy*" (or the exploratory operation) rather than "*enterotomy*." But, as he himself remarks, it is in the latter variety of the disease that nature most frequently effects a cure by the expulsion of the included mass, and he appears to have come to the conclusion that neither operation should be performed in invagination of the small intestine.

Now, as we have already seen, in ileo-cæcal intussusception "expulsion" comparatively seldom occurs, and when it does occur it frequently only postpones the fatal termination, instead of entirely preventing it. The patient dies some months afterwards from contraction of the cicatrix which had formed at the seat of the disease. This appears to me to afford a weighty additional argument in favour of the attempt to explore and,

¹ 'Transactions of the Pathological Society,' vol. xiv, p. 170.

² 'Traité clinique et pratique des Maladies des Enfants,' 1861, t. i, p. 809.

³ Op. cit., p. 179.

pull out an ileo-cæcal intussusception, when the case is correctly diagnosed at an early stage, and when inflation has failed to overcome the disease. The fact that it seems to be possible to determine the existence of an intussusception before the appearance of hæmorrhage, or of other signs of strangulation of the included gut, might be used as an argument in the same direction; but it must be borne in mind that during the long preliminary period which, in these cases, seems often to elapse, adhesions are very likely to be slowly formed between the two opposite serous surfaces. This had, for instance, occurred in my case, above related; and it would most seriously diminish the chances of success in the attempt to pull out the invaginated bowel. Hence I think it would be well for the surgeon who proposes to operate in intussusception to wait until a case comes before him which is known not to be already of long standing. A lesson was, however, taught me by Case 7, *suprà*, which I must not omit to notice. When, after the intussusception had existed four months, symptoms of strangulation at last developed themselves, it was thought by myself and others that the period for any active measures (whether inflation or gastrotomy) had gone by. I supposed that the invaginated part was sloughing and becoming detached; and that inflation, if it proved effectual, would but nullify the curative efforts of nature. The post-mortem examination showed, however, that this was a mistake. The inner layers of the bowel were but little inflamed, and were far from having commenced to slough off.

With regard to the proposal to explore the abdomen in cases of *volvulus* I can say but little. I certainly do not think that the attempt would have met with much success in Dr. Habershon's case of *volvulus* of the cæcum (Case 56), at the post-mortem examination of which I was present. And Dr. Moxon—after inspecting Case 54, one of *volvulus* of the sigmoid flexure—told me that it was with difficulty that the *volvulus* was lifted from its position, and that it sprang back with great force when attempts were made to untwist it, until the uncoiling was complete. His impression was very discouraging, so far as the prospects of success from an operation are concerned. If, however, gastrotomy for internal strangulation should ever become common, or be employed for any but quite exceptional cases, I make no doubt that a *volvulus* of the

sigmoid flexure will occasionally present itself, instead of an internal strangulation of the small intestine.

In conclusion, I will only draw attention to three cases (Cases 40, 55, and 56) in which the intestine was tapped with a trocar to relieve distension. The operation is one which has, I think, been less often practised in this country than on the Continent.

DESCRIPTION OF PLATES

To illustrate Dr. Fagge's Paper on Intestinal Obstruction.

PLATE I represents the ileo-colic intussusception, described under Case 7. The drawing was made after the parts had become shrunken from being placed in spirit. The shrinking affected especially the "returning" layer.

a is the "entering" part of the ileum.

b is the "neck," or the "entering angle" of the intussusception.

c is the outer or "receiving" layer.

d is the cut end of the colon, below the intussusception.

e is the outer or "receiving" layer, here cut open so as to show the contents.

f is the middle or "returning" layer, formed of large intestine; its walls are seen to be thickened. It is cut open so as to show—

g, the internal or "entering" layer.

h is the aperture corresponding to the "returning" angle.

* The probe passed through it penetrates into the interior of the cæcum.

i is the cæcum, forming the lower part of the entering layer.

j is the ileum, forming the upper part of the same layer.

k is the cæcal appendix.

PLATE II represents the morbid appearances seen in Case 46, of cancerous deposit with adhesion and contraction of the intestine. The preparation is drawn as viewed from *behind*.

At *a*, *a*, *a* is seen the posterior or peritoneal surface of that part of the anterior abdominal wall which corresponded with the right iliac region.

At *b* the peritoneal surface is roughened and forms part of the wall of a sloughy abscess, now torn open, which communicated with the interior of the intestine.

c, *d*, *e*, *f*, *g* represent different parts of a coil of intestine which is adherent to the abdominal wall, and of which the two extremities are seen to be closely approximated.

c is the upper end of the coil, formed by the ileum, and slit open so as to show that the calibre of the gut immediately beyond is greatly contracted. A probe, of which the two extremities are marked *, is passed through the narrowed portion. The continuation of the gut is seen at *d*.

e is the lower end of the coil, formed by the cæcum.

f is the ileo-cæcal valve. Through the aperture a probe is passed which emerges at *g*, and of which the two ends are marked **.

h h are masses of subperitoneal fat.

i i are cancerous nodules, developed on the intestine, and on the parietal peritoneum.

Plate. I.

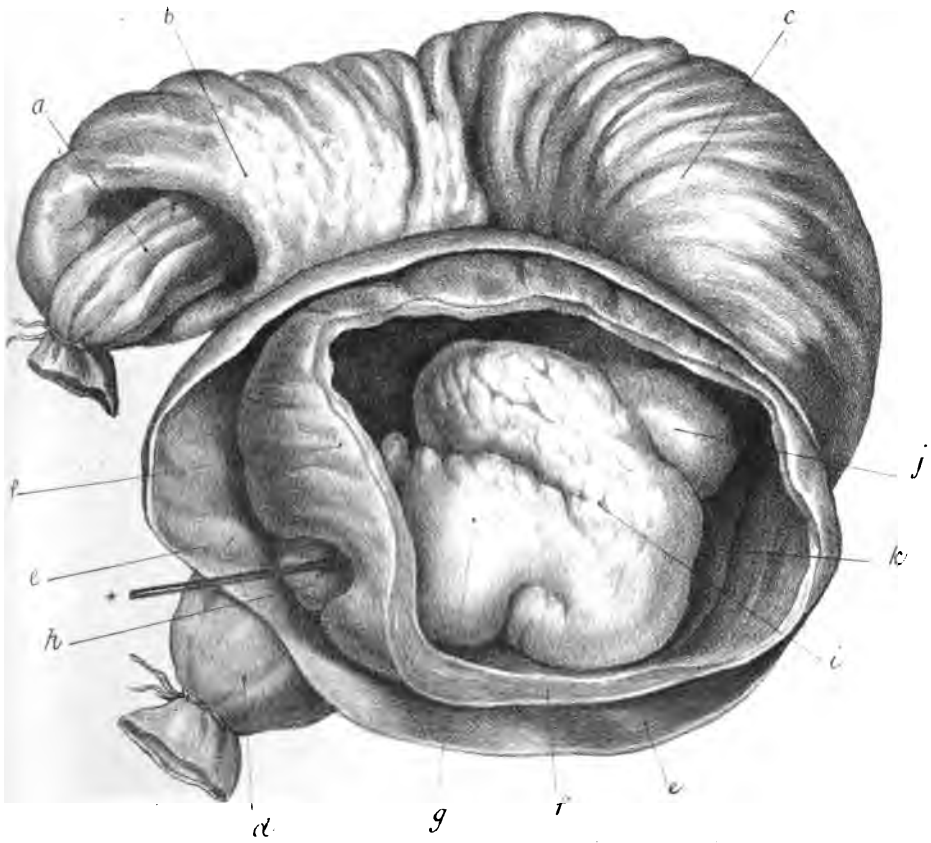
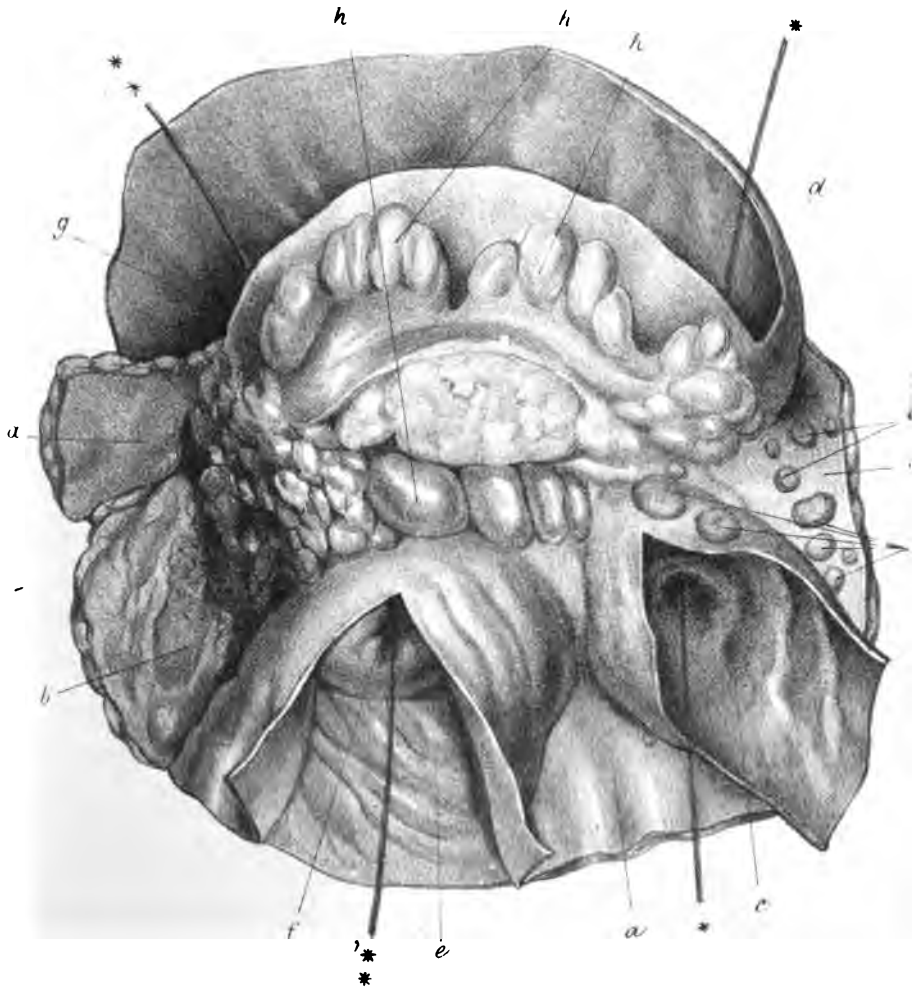


Plate . li .



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TWO CASES
OF
COLLOID CANCER OF THE LARGE
INTESTINE.

BY J. COOPER FORSTER.

THE two following cases of colloid cancer appear to me worthy of record on account of the rarity of this form of carcinoma. A few instances of a similar kind are contained in the 'Pathological Transactions.' In some of those and in both the cases here recorded the disease, besides affecting the bowel, was disseminated over a large part of the peritoneal surface.

CASE 1.—*Colloid cancer of the descending colon, sigmoid flexure, and rectum; attempted colotomy; constipation eighty-eight days.*

This case occurred in private practice. It was seen by Mr. Hiltoh, who first suggested the operation of colotomy, and subsequently by Dr. Rees. I therefore feel that a full report, which has not appeared in print, is, to a certain extent, admissible in a volume of the 'Guy's Hospital Reports.'

As a unique instance of an extraordinarily long period of constipation with symptoms, and also of the exhibition of large doses of opium, it is worthy of being placed on record.

I was called on the 29th of November, 1866, to see a lady upon whom it had been proposed to perform colotomy. The patient was under the care of Dr. Amsden. The late Dr. Jeaffreson had seen her several times, and Mr. Hilton once.

By all of these gentlemen the operation of opening the colon in the left lumbar region was recommended. I received the following history.

The lady was about forty years of age; married, had no children, and of good health previous to this attack; there was no history of peritonitis or of any complaint of the abdomen which could suggest disease at a particular spot, nor was there any family tendency to cancer. On September 3rd she was seized with an attack of diarrhoea, for which Dr. Amsden attended her. At this time she had general tenderness over the whole abdomen, and slight pain in the left iliac region. The attack of diarrhoea lasted ten days, and yielded to treatment. After this illness her bowels became more and more confined, and pain came on at intervals over the abdomen, but more especially in the left iliac region. This part was now (according to Dr. Amsden's notes) slightly dull upon percussion. Until the 10th of October her bowels had been gradually becoming more and more constipated; they were relieved only by enemata to a slight extent; at this date they refused to respond to any mode of relief, and were never again emptied. She now began to suffer constant pain over the whole of the abdomen, although not of an acute character. On November 1st Dr. Jeaffreson saw her, and in a letter to Dr. Amsden makes mention of there being a lump in the left hypochondrium. There was also tympanitis to a slight extent; she vomited occasionally, but not to any amount; there was no great heat of skin or other indications of febrile excitement, and the urine was rather scanty, but clear.

All suitable means were tried for the relief of this patient, such as fomentations to the abdomen, and purgatives in the first place, followed by opiates and the use of the long enema tube. This was passed about fourteen inches up the bowel, when it met with an obstruction, and the injection thrown in returned unchanged. As time went on the pain in the left iliac region increased slightly, otherwise there was not much change in her condition.

When I first saw her she had a rounded, firm, virgin abdomen, by no means greatly distended, and no hardness was to be felt at any particular spot, but the left lumbar

region *seemed* to be rather fuller than the right. There was occasional vomiting, which caused her a good deal of pain ; there was a somewhat anxious expression of countenance ; she had a small thready pulse and cold clammy extremities ; the tongue was clean.

At this time there had not been any evacuation from the bowels since the 10th of October, a period of fifty days. She told me, however, that she thought she had passed a small quantity of flatus.

I examined very carefully the rectum and vagina, but could not detect anything abnormal. I had therefore no hesitation, under the circumstances detailed, in recommending the operation of colotomy. This was exceedingly simple as regards the first steps of the proceeding, and until I arrived at the colon ; the intestine I found flaccid, flabby and empty, and lying deep in the wound. On further examination I was able to distinguish the kidney ; but even after pressing up the fore part of the abdomen, I could not produce any distension sufficient to indicate the site of a distended bowel. I had therefore no other course than to close the incision, which was accordingly done, and the patient put to bed. In four days the wound was perfectly healed, and never gave any inconvenience afterwards. From the day of the operation opiates were again administered, and in a fortnight she was seen by Dr. Roe and Dr. Owen Rees, who continued the opium in larger doses, the patient taking as much as twelve to fourteen grains in the twenty-four hours. During the greater part of her illness the diet consisted of small quantities of chicken, with brandy and water. I again saw this lady on the 15th of December with Dr. Roe, Dr. Rees, and Dr. Amsden, the latter having been most unremitting in his attentions during the whole of her long illness. There was not any marked alteration for the better in her symptoms, and the question therefore arose as to the advisability of opening the abdomen in the linea alba, and making an exploration of the interior. To this proceeding I could not consent for several reasons, but I suggested the propriety of opening the ascending colon instead. This operation, however, was not considered by all advisable, and therefore we attempted only temporary relief by puncturing the abdomen with a fine trocar and canula ; this is a proceed-

ing that I have adopted several times with the greatest temporary relief.

At this period the sickness was very slight; no flatus passed per anum; she continued much as she had been for some weeks, being fully under the influence of opium at all times. There was evidently a more decided fulness to be felt on the left side of the abdomen, about opposite the level of the crest of the ilium, and this was especially marked after the puncture.

From this time I did not see the patient again, but Dr. Amsden reports that she had not any evacuation of fæces or any escape of flatus from the bowels, but that the abdomen became more distended, and the sickness continued. She very gradually sank, and died exhausted on the 7th January, 1867, having lived thirty-eight days after the attempted operation of colotomy, and eighty-eight days from the date of the last evacuation.

A post-mortem inspection was made the next morning in the presence of Dr. Roe, by Mr. Amsden, Jun., to whom I am indebted for the following particulars. I was not present, not having then heard of the death of the patient.

"Sectio cadaveris, twenty-eight hours after death.—General appearance.—Well-nourished woman; abdomen tympanitic and enormously distended; left leg larger than the right (œdematous). *Abdomen.*—On opening the peritoneal cavity a quantity of gas escaped. The ascending colon first came into view, distended by an accumulation of fæcal matter and surrounded by coils of small intestine expanded by flatus; a ligature was placed round the œsophageal end of the stomach and the intestinal canal removed. The stomach, duodenum, and upper two thirds of the ileum, were empty and presented no abnormal appearance; the lacteal glands in the mesentery were somewhat enlarged, and isolated nodules of cancerous deposit existed here and there on the peritoneal investment of the small intestine. These nodules were about the size of a pea, of a reddish-grey colour, and varied in consistence from a pulpy to a tough and somewhat gritty matter. The lower third of the ileum contained a considerable quantity of fæcal matter. The cæcum and the whole of the ascending, transverse, and part of the descending colon were gorged with soft fæces

of the colour of clay. The cæcum and mesocæcum exhibited large patches of congestion and cancerous nodules, somewhat larger and more numerous than those on the mesentery. The appendices epiploicæ were of a dark purple colour.

"In the left iliac fossa, about the junction of the descending colon and the sigmoid flexure, a cancerous mass was found, the size of a hen's egg. The sigmoid flexure itself was occluded by cancerous lumps, and the peritoneal covering of this portion of the intestine was covered with cancerous growths. The cancerous mass also involved the upper third of the rectum, and small excrescences appeared in the space between the posterior surface of the uterus and the rectum. The lower two thirds of the rectum were apparently healthy.

"The cicatrix of the incision made in attempting the operation for artificial anus was found behind the spot where the cancerous mass existed. A deposit of cancerous matter about three inches long by a quarter of an inch wide was found on the peritoneum above the highest point of the iliac crest.

"On opening the intestine it was found that the cancer had surrounded the intestine above the middle of the sigmoid flexure of the colon, and had constricted it to such an extent that an aperture not larger in size than a goose's quill existed. The intestine below the point of constriction was empty.

"*Liver and kidneys* healthy.

"*Lungs* healthy; two or three cancerous nodules from the size of a millet-seed to that of a coffee-bean were found in the pleura pulmonalis.

"*Heart* healthy.

"The disease everywhere presented the usual appearances of colloid cancer."

It will be seen that there are two very interesting points in connection with this case—1st, a possible source of difficulty in performing the operation of colotomy, which I believe, with every care, cannot be foreseen; and, 2nd, the extraordinary length of time during which constipation, arising from disease, may exist. The difficulty of diagnosis which usually attends the abdominal diseases of which this patient afforded a type was marked in her case. A careful attention to all the symptoms, coupled with an equally careful examination of the abdomen, rarely fails to enable the practitioner to arrive at a diagnosis as

to the probable seat of obstruction. Such absolute precision, however, as would have rendered the operation of colotomy in the left loin in this case satisfactory is, I believe, impossible; I cannot, therefore, upon further consideration of all the circumstances of the case, see how it was possible to have determined that the disease extended a few inches higher than the position in which it is more usually found, and that consequently the ascending colon should have been opened instead of the descending.

A circumstance which was well marked, and one which is very characteristic of the seat of the mischief, was the fact that water injected per anum returned unchanged. This is a symptom which points out unmistakably the seat of the disease; it invariably indicates that the disease is low down, though it does not, as this case shows, prove that the bowel higher up is free.

I performed the operation of colotomy, as I have always done, in the manner recommended by Callisen, namely, by making a vertical incision through the parietes instead of a horizontal. That no ill result accrued to the patient from the operation was evident from the manner in which the whole wound healed in four days without the slightest suppuration. The question occurred to me at the time of the operation whether I should not open the colon on the right side, but as no suggestion of the kind had been made, either to the patient or her husband, I scarcely felt justified at that moment in performing it.

On my second visit, when the constipation still continued and the question of opening the abdomen in front was discussed, I again suggested the propriety of attempting the operation in the right lumbar region; this, however, was not assented to. My reason for not opening the abdomen in front with a view of exploring the interior was that the symptoms were not those of that well-marked strangulation which would have warranted an expectation of finding a band whose division could have afforded any relief; moreover, the great uncertainty and danger of the operation render it a grave question whether it should ever be attempted under any circumstances.

The second point in connection with this case, viz. the

protracted period of constipation, demands one word of notice. I cannot find an account in the works I have consulted of any period at all approaching the time during which this lady suffered. Sir T. Watson does not give any case lasting longer than forty-six days.

Fæcal impaction or retention may last, and has lasted longer, as a case reported by Mr. Staniland in the 'London Medical Gazette' of 1832-33 shows.

An old lady, æt. 73, had no action for the bowels for four months and eight days, when they were freely acted on, and she is said to have passed a bushel of fæces. Constipation again occurred, and this time for seven months, when death happened from a blow on the cæcum causing fæcal extravasation.

There is, however, a broad line of distinction between this case and the one I have reported, for injections cured in one instance, but returned without effect in the other.

It may also be observed that in my case the manner of death was different from that noted in most recorded instances of a similar kind. The fatal termination in the former was due to exhaustion alone; in the latter it has generally happened from ulceration and extravasation of fæces.

CASE 2.—Colloid cancer of intestine; Colotomy.

(From Reports by Messrs. MAYNARD and SEYMOUR.)

John Kelly, a shoebblack, æt. 22, was admitted into John Ward on November 29th, 1868.

He was a cripple, and had never had good health. For eleven weeks he has suffered from pain in the lower part of the abdomen; for three weeks he has been confined to bed. His bowels have been constipated for some time. Since the twenty-third they have not been opened, and his abdomen has been swelling; he has had intense pain coming on in paroxysms, and has vomited everything he has taken.

On admission (November 29th), face pale and distressed; pulse quick and small. Tongue pale, flabby, and slightly furred. Abdomen distended and tender. Indistinct fluctuation can be felt through it. Hot fomentations were applied, and a castor-oil enema injected.

November 30th.—Patient much the same. Can only take fluids, which he vomits immediately. Is in great distress, with paroxysms of pain in the abdomen. Urine scanty, loaded with lithates.

A bougie was introduced, but could not be passed above six inches up the rectum.

An examination was made under chloroform. In the centre of the gut a hard mass could be felt about five inches up; the gut which was below was smooth and normal. The upper part terminated in a hard irregularly nodulated mass by which the passage seemed to be completely closed. Mr. Forster endeavoured to push his finger through, but was unable. A proposal was then made to operate but the patient would not consent.

Patient continued in much the same condition until December 2nd. His urine was very scanty; he kept vomiting whatever he took, but the vomited matter was neither sterco-raceous nor bilious. This evening Mr. Forster operated by request of the patient and opened the descending colon by Callisen's method, that is, by the vertical incision; the gut was easily reached and stitched to the integuments as usual. Immediately the intestine was opened there was a moderate escape of fæces, which were fully formed; they were of the consistency of a healthy evacuation. The patient was relieved from pain by the operation, and the abdomen became softer and less tender. The fæces in a solid state and well formed escaped freely from the wound. The urine was much increased in quantity, being somewhat over two pints in the twenty-four hours. He was still troubled with constant vomiting. For a few days he was feverish; he then became drowsy and weak, and gradually sank, not complaining of much pain, but vomiting all his food. His abdomen became very tense and contained fluid. The fæces always escaped pretty freely, and were solid. He once passed a small quantity per rectum.

He died on December 24th, twenty-two days after the operation.

(Report of the post-mortem examination by Dr. Moxon.)

Immense ascites; more than two gallons; the fluid was straw-coloured and clear. The whole intestinal canal lay in a

most curious way shrunken back into the hinder part of the cavity, yet not adherent in any abnormal way. There were two adhesions of the omentum; one across the front of the spleen, and one down to the sigmoid colon at the site of the cancer. Thus, as the omentum was contracted and indurated excessively and the adhesions were very thick and strong, the whole of it made a sort of arch from the left hypochondrium to the sigmoid colon, passing along the course of the transverse colon but not abnormally adherent to it. This thick arch circumscribed the small intestines above, to the right, and below; and these small intestines were so small that they resembled curiously a little bad-coloured brain with its convolutions; they made a bunch which was as close as a brain's convolutions but not so large; the coils were separate and small in calibre, but enormously thickened so as to feel very substantial. The colon was very short and narrow and thick walled: it had no external curve of a sigmoid flexure. On opening up the lower part of it, which was full of scybala, there was found, about five inches from the anus, a hard mass in the subperitoneal tissue like scirrhus cancer, gristly on section, but not yielding any milky juice. Three inches above this was another of the same sort; the omentum was adherent to the lower of the two. The surface of the peritoneum was covered with small tubercle-like dots on the intestines; the flanks and diaphragm were lined by an excessive quantity of the same formation.

Liver, fifty-six ounces, free from cancer, but its capsule was thickened, as also the gall-bladder.

Microscopical examination of the mass showed a well-marked specimen of colloid cancer.

The difficulty of diagnosis owing to the youth of the patient must not be overlooked in this case. It is not often at such an age, twenty-two, that we meet with cancer of the rectum, and yet the sensation given to the finger introduced per anum was that of well marked carcinoma. The mass was only, however, to be felt satisfactorily when the patient was placed under the influence of chloroform (a proceeding which I think should always be adopted) owing to the height up the rectum at which the disease was situated. It was doubted at

the post-mortem whether it was possible to have felt a malignant mass situated so high up as this appeared to be; there was no doubt of its having been accomplished, as the inspection proved the truth of the diagnosis; moreover at the examination in the ward I called the attention of several of the senior students, who also examined the patient, to the unmistakeable character of the mass. I think the "bearing down" of the intestines during life brought the diseased mass nearer to the anus and so enabled it to be felt, whereas after death this condition did not, of course, exist; and so the cancer appeared to rise up out of the pelvis and gave the idea that naturally occurred on the post-mortem table that no man's finger could have been long enough to reach the disease. I need hardly say I did not introduce my whole hand into the rectum.

The escape of solid fæces in considerable quantities from the wound made in the operation is a curious fact; the greater part of these fæces seemed to come from the intestine between the wound and the disease, and to have been pushed out by an anti-peristaltic action—an action I am well aware denied by many physicians; but there certainly was no other satisfactory explanation of the passage of these solid portions; some also remained behind, as the post-mortem proved.

It was, I think, clearly shown at the inspection that they could not have come from any other portion of the intestine; the coils were so small and shrivelled that I doubt whether anything had passed along them for many days, and yet the solid feculent masses appeared at frequent intervals in the poultices when they were removed.

Judging from the appearance of the intestines it seemed probable that the operation had, at any rate, relieved the distress from distension and prolonged life for some time.

ON
ERECTILE TUMOURS OF THE FOOT.

By ALFRED POLAND.

It has fallen to my lot to have had under my care at Guy's Hospital a most interesting and, at the same time, a very rare case of "erectile" or cavernous vascular tumour occupying the dorsum and sole of the foot in a young female of nineteen years of age, for which amputation of the leg was resorted to.

The obscure nature of the disease, and the unsuccessful measures adopted for its cure, together with the subsequent elucidation of the pathological conditions after the removal of the limb, fully entitle these facts to be placed upon record in the annals of surgical observation.

In offering this case to the perusal of my readers I shall, in the first place, so far as my notes will permit, give an accurate detail of the history, progress, treatment, and termination thereof; and having done this I shall append such other cases as appear to bear upon the present one, so far as regards the situation of the disease in being confined to the structures of the foot. I shall next make some few general observations on the difficulties in the diagnosis and treatment of the affection in my case. I shall then call attention to the term "erectile" used by me in this communication, in preference to other terms which perhaps might have been more suitable to the ideas of

some eminent pathologists; and finally I shall make such other comments as space will allow.

The dissection of the foot, the investigation of the structure of the tumour and of its connection with the vascular system, and the microscopical examination, have all been accurately and faithfully carried out by Mr. Howse, the Assistant-Demonstrator of Anatomy. I have deemed it fit that his report should form a separate communication in connection with this paper; and it is annexed accordingly, with plates illustrating the conditions found.

CASE 1.—Pulsating tumours of the foot; ligature of the tibial arteries; amputation of the leg. Recovery.—(From notes furnished to me by Mr. Eastes, lately Surgical Registrar, and by Mr. Elliott, Dresser to the case.)—Kate H—, æt. 19. Living at Peckham. Admitted into Guy's Hospital on November 22nd, 1865, under the care of Mr. Poland. She was a delicate but well-formed girl, and had suffered much during the past few years in consequence of her lameness, which had prevented her taking much exercise.

She stated that ten years ago a writing-desk fell corner ways on her right foot, striking it on the dorsum between the metatarsal bones of the fourth and fifth toes. She experienced a good deal of pain at the time and walked lame for several weeks, when she went to a medical man, who said it was a sprain, and gave her some liniment to rub in, telling her it would get well in time. She, however, did not improve in the least, and a swelling made its appearance on the dorsum of the foot at the injured spot, and continued slowly increasing; the lameness was still the subject of much anxiety. For two or three years the lameness remained unabated, and the foot was much the same; and she had at times further advice on the matter. She was ordered embrocations and also to have the foot pumped on with cold water; this latter treatment she could not bear; in fact it made the foot worse. About seven years after this accident (three years ago) she had an attack of scarlet fever, for which she remained in bed about three months altogether. The swelling in the foot, as well as the pain, seem then to have in a great measure subsided. But when she got about again she observed a swelling in the sole of

the foot, and the tumefaction on the dorsum became evident; her lameness was in consequence likewise still persistent. She persevered in the embrocations, and in giving as much rest as possible, but derived no benefit whatever.

She attended as an out-patient at Guy's Hospital during September and October, 1865, but experiencing no benefit, she became an in-patient in the month of November.

On admission there was a soft, elastic swelling, about the size of a half-crown piece, situated on the dorsum of the foot over the fourth and fifth metatarsal bones and the adjacent intermetatarsal spaces close to the phalangeal extremities. It did not feel as if it were very well circumscribed, although in appearance it had a tolerable outline. It was very tender and painful, but the skin over it was quite natural. There was some little fulness in the sole of the foot, which was very indistinct and indefinite, and did not attract much attention.

The patient was placed in the recumbent position, and the leg was put upon a back splint with a foot-piece, so as to maintain perfect rest of the foot. Cold was at first applied, but could not be borne, and the only relief obtained was from warmth. She was ordered some strengthening medicine and the application of tepid saturnine lotions. At the end of a week the tenderness and disposition to inflammation had subsided, so that one was enabled to make a more accurate examination of the tumour. After much careful manipulation an indistinct pulsation was detected, but the swelling had a remarkably elastic and fluctuating feel, insomuch that it was conjectured that it might be a chronic abscess or a cyst receiving impulse from underneath. Accordingly an exploratory incision was made, and red arterial blood issued from the aperture in a continuous stream. It was, therefore, now very evident that we had to deal with a blood tumour. A compress was applied and the hæmorrhage was immediately arrested. Some inflammation and subsequent induration ensued, and hopes were entertained that the tumour would then undergo a spontaneous cure. However, at the end of a fortnight the parts returned to their former condition; and the lesion being now recognised as one of a vascular kind, special regard was paid to its characters. There was a decided but very feeble pulsation in the tumour; the expansion, equally diffused over the swelling, corresponded

with the arterial pulse. A kind of sphygmograph, a fine hair attached by its base over the centre of the swelling by a slip of strapping, leaving the end free, demonstrated most satisfactorily the arterial pulsation, rising and falling synchronously with the radial pulse. Pressure on the dorsalis pedis artery seemed to have perfect control over the pulsation; compression thereof not only arrested it, but diminished the tumour.

The limb was kept raised above the level of the body, and was placed on a back splint. The position tended to allow of some subsidence, but did not cause disappearance of the tumour.

The case was considered to be possibly one of traumatic aneurism with a cirroid condition of the arteries on the dorsum of the foot; and, in consequence, Mr. Poland suggested ligature of the dorsalis pedis artery, as pressure on this vessel seemed effectually to control the tumour. The operation was performed in the usual manner, but the artery was found to be double its usual size, and its coats were so thin, that in securing the ligature care was required to avoid cutting the vessel through. This operation seemed to be successful for a time, but at the end of three weeks the pulsating tumour re-appeared as before, but somewhat lessened in size. In the sole of the foot the disease had gone on increasing in the mean time, and now there could be plainly felt a similar pulsating tumour of a circumscribed character in the sole. This was commanded by pressure on the posterior tibial artery, and it was deemed advisable to place a ligature upon this artery behind the internal malleolus, above the bifurcation. Early in February Mr. Poland applied a ligature to the artery, which was found in a dilated condition, of the size of a quill, with thinned walls; its satellite veins were in a natural condition.

This measure, together with direct compression, and keeping the limb raised, was attended with marked good results, and expectation was raised as to a cure.

She remained in the hospital until March 14th, 1866, and left with perfect disappearance of the tumour. She was ordered to continue for some time direct compression by means of a pad and bandage constantly applied.

On April 10th, 1866, she again sought admission. She had neglected her instructions, and the tumour on the dorsum

had reappeared, but that in the sole of the foot could not now be detected. As he had been so far successful, and as there appeared to be a large vessel running along the outer side of the foot supplying the tumour, and as the pulsation in this vessel and in the dorsal swelling was entirely commanded by pressure on the anterior tibial artery above the ankle-joint, Mr. Poland proposed to give the patient the benefit of the chance by ligature of the anterior tibial artery in the lower third, before resorting to any other measure. The artery was accordingly tied, and presented the same conditions as the previously tied vessels; it was two thirds larger than natural and somewhat tortuous; and its coats were excessively thinned, so as to necessitate the greatest caution in tightening the ligature. This third operation seemed to have the desired effect; the swelling disappeared, the foot resumed its natural appearance, and there was no pain or throbbing. Accordingly the girl was presented "*cured*" on May 13th, 1866, with instructions to wear a bandage to give support to the foot and leg.

She went home, and after three or four weeks experienced most severe and dreadful pains in the foot, extending right up the limb as far as the hip, which latter became swollen a good deal. The lameness became as bad as ever, and she was scarcely able to get about. She now also complained of her back.

On August 2nd, 1866, the girl was admitted into the hospital under Mr. Poland for the third time. The tumour had reappeared to some extent and was elastic and fluctuating, and there was no evidence whatever of coagulation or consolidation having taken place. It was now suggested to treat the case as one would an aneurism in which the fluid contents should not coagulate in consequence of a deficiency in the coagulating power of the blood; and as one or two successful cases had recently occurred in Guy's Hospital under the supervision of Dr. Owen Rees, where an aneurism with indisposition to coagulation had been considered to be cured by the internal use of acetate of lead, it was deemed advisable to try the remedy in this instance. Dr. Rees saw the case and ordered the acetate of lead treatment.

The treatment made her very ill, and there was no improvement whatever in the foot after moderate compression was used.

And as her health began to fail, she was sent out of the hospital to recruit her strength, with the intention that she should afterwards return to have some operation performed as should be deemed advisable. She left on the 7th of September.

On the 9th of November, 1866, she was again admitted. She had perfectly recovered from the effects of the lead treatment, and was much improved in health.

She had still great lameness and complained of her back, and, on examination, this proved to result from commencing lateral curvature of the spine, in consequence of the weight of the body being thrown upon the sound leg.

The then condition of the foot was described as follows: There is a pulsating tumour in the foot, most manifest on the dorsum, but which can be distinctly felt through the foot from the dorsal to the plantar aspect; it extends from the heads of the four outer metatarsal bones backwards towards the tarsal bones, to within a short distance of the ankle-joint; it is bounded laterally by the metatarsal bone of the great toe on the inner side, and by that of the little toe on the outer. In the sole of the foot it seems to be confined laterally by the same bones and extends as far back as the tarso-metatarsal articulation. The swelling on both surfaces is smooth and even, the skin covering it looking as healthy as the surrounding integument; it is soft and fluctuating on pressure. The bodies of the second, third, and fourth metatarsal bones appear to have been eroded or partially destroyed by the tumour; at about half way back from their heads to their bases, or about the middle of their shafts, an abrupt sort of termination can be felt. Running transversely across the dorsal surface of the foot there can be seen a large tortuous vessel, which pulsates freely; the small cutaneous vessels about the malleoli are much enlarged and have a varicose appearance; there is great tenderness on pressure over the tumour itself; it pulsates most perceptibly, the pulsation not being diffused over the whole of the tumour as in ordinary aneurism, but apparently confined to the vessels which run through it, and thus being especially distinct an inch behind the interspace between the third and fourth toes, just in the line of the large tortuous vessel above described: the pulsations are synchronous with the pulse at the wrist, and were about 90 when counted at the time of examination.

There is great tenderness also on pressure over the tarsus, and she describes the tenderness as reaching quite up to the knee. She has lost the use of—or, more properly speaking, the power of moving—the toes of that foot, with the exception of the great toe, which can be moved a little. Latterly, she has complained of pain up the right leg and the right side of the abdomen, and chest, even to the shoulders, but particularly between the knee- and hip-joints. The hip swells when she uses the leg at all, and it is rather puffed up and increased in size in comparison with the left hip, even now, when she has been in bed for a week. Pressure on the femoral artery in the groin stops the pulsation in the tumour of the foot. On applying the stethoscope over the tumour on the dorsum of the foot, a faint musical sound or murmur is distinctly audible; and over the femoral artery in the groin, every now and then, is heard a peculiar whizzing, rasping sound, as if the inner coat of the vessel were roughened. The temperature of the left leg about the middle, between the knee and ankle-joints, is perceptibly higher than that of the right leg at the corresponding point, but the temperature of the left foot is much lower than that of the right foot over the tumour. On pressing the foot upwards against the acetabulum, there is pain in the hip-joint, and on lateral pressure against the trochanter there is pain in the right and none in the left side; the pain extending from the great trochanter downwards towards the front of the thigh to the inner side of the knee, and upwards from the great trochanter to the ilium, and along the right side to the scapula. She describes it as a “burning pain,” and as being continuous whether she walks or not.

The question now was raised as to the proper course to be adopted, whether ligature of the femoral artery was to be had recourse to, or amputation of the limb below the knee, or any local measure, such as the use of a coagulating injection, galvano-puncture, &c. It was decided that under all the circumstances of the case amputation should be performed; and this accorded with the express wish of the patient herself. The leg was accordingly amputated below the knee-joint; no difficulty occurred, excepting that several enlarged deep veins had to be tied. She made a rapid recovery, and was presented convalescent on January 12th, 1867.

The patient has been seen frequently since that period, and was heard of in November, 1868. She was enjoying excellent health, and was able to perform domestic duties; the incipient spinal curvature had not increased, nor did it give rise to any uneasiness or anxiety.

I will now append certain cases bearing upon the above one. It was my intention, in the first instance, to have entered elaborately into the whole domain of erectile tumours as affecting, not only the foot, but the lower extremity and upper extremity in general, on account of their offering some peculiarities and some deviations from the ordinary characters of such tumours affecting the head, face, neck, and body.

However, the cases collected together were so numerous, and each had such special interest, that they would have been sufficient to form a separate work; and to have included them in this communication would hardly have been adapted for the 'Guy's Hospital Reports.' I have, therefore, confined myself to cases of erectile tumour affecting the foot.

These are but few in number, but when associated with my own case they offer some interesting points of resemblance, which may assist us in the elucidation of the difficulties met with.

CASE 2.—Plantar aneurism by anastomosis; amputation of the leg; recovery.—In the published 'Pathological Cabinet' of the New York Hospital, at page 262, a preparation is described (No. 656), bearing upon the subject in hand; the account of it is as follows:

Plantar aneurism by anastomosis.—From a shoemaker, æt. 19, on the sole of whose foot a blue spot had appeared five years previously. This spot soon ulcerated, and from it copious hæmorrhage continued at times to occur. The ulcer was two inches in diameter and rested upon a pulsating erectile tumour, which completely filled the hollow of the foot.

In it a bruit de souffle was audible and the swelling disappeared on pressure, and remained collapsed when the tibial arteries were compressed. All efforts to close the ulcer proved unavailing and the leg was amputated. A tumour is seen filling up the concavity of the sole, situated in part between

and in part superficial to the muscles. It is formed of innumerable vessels, chiefly of the size of a crow's quill, forming an intricate network to and from which the blood is conveyed by numerous large vessels, all of which have been filled by the coloured injection, which passed through into the veins from the arteries. In the course of both the anterior and posterior tibial arteries are three large vessels, evidently the artery and its *venæ comites*, all enlarged; as is also the peroneal artery. Crossing the front of the lower third of the tibia, from behind forwards, is a vessel larger than any of the others, and equalling the femoral in diameter: it divides below the ankle-joint into two sets of branches, most of which pass into the plexus in the sole, while the remainder supply the toes from the dorsum of the foot with vessels of normal size.

CASE 3.—*Ulcerated erectile tumours of the foot on the left side; cauterisation with the acid nitrate of mercury; cure.*—Dupuytren, 'Leçons Orales,' tom. iii, p. 207.—D—, æt. 8 months, born in the country and well developed, was sent to M. Dupuytren by M. Marjolin on the 3rd of March, 1828. This infant came into the world with two red port-wine stains; these raised the skin and were formed by an abnormal development of the capillary system. The one occupied the whole of the dorsal aspect of the first three metatarsal bones of the left foot, and extended between the first two toes to the plantar surface of the foot, where it occupied a space of about one inch. The second was seated at the external and middle part of the thigh of the same side, and was of the size of a franc piece.

For some time these tumours remained stationary, and were only the seat of sanguineous congestion, being more prominent and coloured when the child cried. Towards the third month the cries of the little patient showed that it was in pain. It was then perceived that the tumour in the foot was increasing in size, and soon superficial ulcerations appeared between the two toes. At first no hæmorrhage occurred from these ulcerations, although each day they extended in breadth and depth. The general health became by degrees impaired; the ulceration gained the dorsal aspect of the foot, and after

five months' progress the infant was sent to Paris in the following condition :

A deep fissure existed between the two toes and continued on to the dorsal and plantar surfaces of the foot, with ulceration of about two lines in depth ; it had a greyish, pale fungous surface, with elevated, turgescient, hard, and violet-coloured edges, formed of the *débris* of the erectile tissue. The ulceration had commenced in this tissue, which seemed to have been the seat of a destructive process analogous to that occurring in hospital gangrene.

M. Dupuytren, after a careful examination, considered it to be a degeneration composed of erectile tissue and of a matter of cancerous appearance. The purulent sanies mixed with the *débris* of the ulcerated tissues was remarkably fetid. The surrounding parts appeared tumefied, and the first two toes were swollen. It was thought that the affection extended to the subjacent osseous tissues. The tumour on the thigh had grown, but was not ulcerated ; it was uneven, of a violet red, and its colour was readily effaced by pressure. It was about double the size that it had been at birth. M. Dupuytren gave a very grave opinion about the case, and even thought of amputation of the limb, but he was deterred from this idea by the fear of a return, and especially by the presence of the tumour in the thigh, which was evidently analogous to that of the foot ; these considerations determined him to employ cauterisation with the acid nitrate of mercury, with a view to change the nature of the ulceration and to obtain cicatrisation.

The first cauterisation of the ulcerated surface was performed on the 7th of March, but without any apparent good effect ; a second cauterisation on the 14th of March, which was followed by an abscess in the upper and back part of the thigh, which was opened and subsequently healed.

A third cauterisation was practised on April 9th, and its results were very advantageous.

Other cauterisations were made to the number of nine, at intervals of five days. The success surpassed expectation, and towards the end of May the cicatrisation of the ulceration of the foot was completed.

In the tumour on the thigh other changes took place ; the tumour in this region, which up to the fifth cauterisation had

remained stationary, became progressive; ulceration took place on its surface and in its substance; and there became established at this spot a kind of "*émonctoire*" which resisted cauterisation, and which seemed to increase in proportion as the ulceration on the foot healed. M. Dupuytren thought it advantageous to have an issue established, which was accordingly done on the left arm. The suppuration which this occasioned produced very beneficial effects. Five cauterisations brought about the cicatrisation of this last ulceration, without the health of the infant suffering.

On the 25th of June the cure was complete. The infant remained in the hospital for the arrival of the parents, and left cured on the 10th of July.

CASE 4.—*Tumour on the dorsum of the foot; exploratory puncture; fungus hæmatodes (?) ; partial amputation of the foot; recovery.* Dupuytren, '*Leçons Orales de Clin. Chir.*,' tom. iii, p. 244.—L. —, æt. 33, a woman of good constitution and sanguineous temperament, was admitted into the Hôtel Dieu on the 5th of July, 1825. Ten months previously she had made a false step, by which the heel was forcibly drawn back and the foot stretched upon the leg; the whole weight of the body was thus thrown upon the extremity of the left limb; she states that she heard something crack at this part, and experienced acute pain. The foot swelled rapidly, and became red and painful. Leeches were applied, then resolvents; but rest was not given to the part.

Three days after the accident a tumour appeared in the direction of the second toe; it was, according to the patient's account, moveable and pulsatile; it gradually increased in size during a period of five months; its development then ceased and remained the same up to the time of her admission. Before coming to the Hôtel Dieu she had consulted several medical men, and nearly all considered the case to be one of aneurism. A great number of leeches had been applied, thirty or forty of them being placed on the tumour; and by each application the pulsations and pain were diminished; but in two or three days afterwards these symptoms reappeared. Emollients and resolvents were also had recourse to, but without satisfactory results. On examining the patient, the

tumour was found seated on the dorsum of the foot, over the second and third metatarsal bones, extending laterally to the first and fourth metatarsal bones, and from behind forwards from one to two inches in front of the tibio-tarsal articulation to the base of the toes, projecting about an inch above the dorsum of the foot; adherent at its base, without heat, redness or ulceration of the skin. At the first examination the tumour was thought to be gummous, but the patient, when questioned upon the subject of a venereal affection, denied any knowledge of symptoms of that disease. The tumour more accurately examined gave evidence of deep-seated pulsation, obscure, yet quite decided. M. Dupuytren thought at first that the pulsation existed only in the line of the dorsal artery of the foot, and that the tumour was an abscess behind which the artery was placed, thus giving rise to the pulsating movements. Some persons thought that the disease was of an aneurismal or fungous nature. In fact, the tumour evidently presented pulsation, such as is observed in an aneurismal tumour, throughout its whole extent; the pulsations of the dorsalis pedis artery, displaced and carried inwards towards the summit of the tumour, could be recognised as distinct from those of the tumour; this latter, when its whole surface was compressed, raised the hand by movements of expansion in all directions, synchronous with the beats of the pulse; and the finger carried round the circumference of the tumour could detect these pulsations, which ceased immediately when the anterior tibial artery was compressed.

The patient complained of very severe pains, which, according to her, prevented her sleeping; but her condition did not indicate that such was the case. M. Dupuytren again examined the tumour, but its diagnosis was then less clear and less easy to establish; he was uncertain whether it was an abscess in front of the artery or an aneurismal tumour. It was found that the dorsalis pedis artery could be displaced without stopping the pulsation in the tumour, and this fact increased the uncertainty of the diagnosis and rendered him more and more inclined to think of the possibility of the existence of aneurism. M. Dupuytren had the patient brought into the operating theatre, and stated that he should at first make a simple exploratory puncture, which would not

hinder him from discovering and tying the vessel if it was the seat of aneurism. The necessary instruments were ready for this purpose, as well as those for amputation, in case the tumour should be seated in the osseous structures, and should be of the nature of the disease called fungus hæmatodes.

The femoral artery was compressed, and then a bistoury was plunged into the centre of the tumour; only a small quantity of black blood escaped and this not in jets; the pressure was taken off the femoral artery, and the flow of blood was then not more rapid or abundant. The incision was now enlarged, and there was felt a kind of fleshy tissue, soft, retiform, and bleeding. The removal of this was partially attempted by the fingers and by forceps; but portions only could be got away. It was then found that the tissue was analogous to that of the corpus cavernosum penis, and even more so to that of the placenta. There was felt in the spaces from the first to the third metatarsal bones a substance of the same nature, but with small spiculæ disseminated through it.

Dupuytren decided immediately to perform partial amputation of the foot according to Chopart's method.

Cicatrization of the wound commenced on the sixth day, but was not completed until the sixth week, when she left the hospital convalescent. A boot was provided for her which masked the deformity and facilitated her walk.

The part removed was examined with care, when it was found that the seat of the body of the second metatarsal bone was occupied by a carcinomatous substance; there was felt here and there the *débris* of an osseous matter; this was especially the case towards the extremity of the bone supporting the toe, which was, however, healthy, as were also the diathrodial cartilage and the articulation itself. From the posterior extremity of this bone the disease had involved the first, second and third metatarsal bones, and also their articulations with the cuneiform bones, and at this point the disease consisted of a softening and partial disappearance of the spongy substance of the bone. At the posterior part of the first metatarsal bone the disappearance of the bony structure was carried to such an extent that there existed an irregular cavity, large enough to receive a nut, bounded behind by a simple osseous lamella, healthy in appearance, and

supporting a diathrodial cartilage free from ulceration. The posterior extremity of the ⁴third metatarsal bone was hollowed out, offering a cavity of the same kind but less extensive, of which the outer surface was covered by a layer of grumous blood. The first cuneiform bone, partly destroyed, was likewise softened and rarified, if one may use the word, and its spongy substance resembled the vascular tissue of the spleen, of which all but the frame or the solid and fibrous network has been removed by washing. The second cuneiform bone was less diseased, and the third still less; however, their alteration had the same characters as that of the first of these bones.

CASE 5.—Paul, 'Die conserv. Chir. der Glieder,' Breslau, 1854, relates at page 402 the case of a child three months old, who had an aneurismal vascular (vessel) tumour on the third toe of the left foot, of the size of a walnut and seated over the metatarso-phalangeal joint: it seemed to consist of an extraordinary quantity of enlarged and closely-packed vessel loops, which shone through an attenuated but normal skin, as a blue reddish elevation, feebly pulsating. On exploring with the finest needle, the swelling bled most profusely. It was stated that the child was born with this affection. Extirpation of the growth was suggested, but this would have required the removal of the toe, and the incision would have had to be carried deeply into the intermetatarsal space; hence the following plan was adopted:—Six long strong needles were passed through the base of the tumour as deeply as possible; and then worsted threads were wound around these with firmness and many times, so as to form equable pressure upon the whole of the tumour and thus act as a compress; over this ice was applied. It was intended that the needles should be allowed to ulcerate through, with a view to the obliteration of the vessels. At the end of six days, however, there was a rapid and extraordinary decrease of the swelling, so that the threads, which had become loose, required to be reapplied. The tumour became more and more atrophied; the needles did not ulcerate through and had to be removed; in six weeks the growth became dense and firm, and had shrunk to scarcely one sixth of its original size.

Paul remarks that such cases are favorable for galvanopuncture and galvanocautery.

Remarks.—Such are the materials which we are enabled to bring together to elucidate the remarkable case which has been the subject of the present communication. The evidence, as shown in the examination of the diseased structure by Mr. Howse (see paper appended), fully proves the nature of the growths found in our case, viz.: that they essentially consisted of a structure analogous to that of the erectile, spongy, or cavernous tissues met with in the animal economy in certain necessary organs, and that these accidental growths were in direct communication with the arteries and veins. They were not dilated capillaries, as in Teleangiectasis, but purely extraneous growths. Case 2 is called in the American Catalogue “Plantar Aneurism by Anastomosis,” which, of course, is John Ball’s term for these erectile tumours. In this case the disease was, in some respects, similar to that which existed in Case 1. It is singular that the ages of both patients, one a male, the other a female, were the same, viz., 19; but the length of time the disease had existed, and the nature of the cause, were different. The female dated the origin of the disease to ten years back, at nine years of age, when the corner of a desk fell upon the foot, on its dorsal aspect, near the heads of the metatarsal bones of the fourth and fifth toes; she said there had previously been no defect or spot upon the foot, and this the mother confirmed most fully. Hence there was no fact to warrant us in concluding that the disease might have originated from the sudden development of an overlooked nævus; so that I think we may fairly set aside this as the *fons et origo mali*. In the young man, on the contrary, the disease had existed only five years, he being then fourteen; it had not followed any blow or injury, but was first observed as a blue spot on the sole of the foot. It is unfortunate that the history of the case is so meager, but, in all probability, we may fairly presume that it may have been a congenital nævus in the first instance, which had remained quiescent up to the time of puberty, when it began to take on an active condition and became developed into a vascular new growth, very similar in structure to Case 1, but consisting almost entirely of dilated capillaries,

with very little connective tissue, and fibrous structure, and septa. The structure is stated to have been formed of innumerable vessels, chiefly of the size of crowquills, forming an intricate network to, and from which the blood was conveyed by numerous large vessels. This peculiarity in *nævi* of remaining quiescent, and suddenly developing themselves into dangerous vascular or erectile tumours, is by no means uncommon. It is alluded to in all our surgical works, and will not here be entered upon.

Case 3 was essentially a degenerated *nævus*. Dupuytren himself states that after a very careful examination he considered it to be essentially a degeneration of erectile tissue, but he adds, also, that there was matter of a cancerous appearance. This latter point, however, is very doubtful, as he merely remarks its appearance, and gives no further evidence. The treatment adopted, the existence of a similar growth on the thigh, which was likewise submitted to cauterisation, and the perfect cure of the case sufficiently attest the benign character of the disease.

Case 4 is likewise one of Dupuytren's, and is placed by him under the head of *Fungus hæmatodes*. This case in some respects bears considerable resemblance to Case 1. The origin of the new growth on the dorsum of the foot was due to the making of a false step, whereby the heel was forcibly drawn back, and the foot stretched upon the leg, so that there was a sensation of something having cracked. The patient was a female, and thirty-three years of age; and the disease was only of six months' standing. She was a woman of good constitution, and no mention whatever is made of any previous mark or peculiarity about the foot, a point which Dupuytren would never have overlooked. The nature of the growth was only ascertained when cut into, and after the removal of the foot. When the incision had been made into it, there was felt a kind of fleshy substance, soft, retiform, bleeding; on trying to remove it, only portions came away; it was then found that the tissue was analogous to that of the *corpus cavernosum penis*, and even more so to that of the placenta. After amputation, the disease was again examined with care, and considered to be carcinomatous. However, if we carefully

consider the account of the dissection, together with the description of the appearance of the tumour in the exploratory incision, we may fairly presume that this case was one of vascular, cavernous tumour, purely benign in character, and not malignant. It would seem that the supposed carcinomatous condition met with in this case was due entirely to inflammatory action; and the same conclusion may be applied to Case 3, which undoubtedly was not cancerous.

Case 5 was purely congenital, like Case 3, but had not gone on to ulceration; it was a degenerated nævus, forming an aneurismal vascular or vessel-tumour, as Paul describes it.

It will be hardly necessary to enter into the structure of these erectile tumours; that in Case 1 is fully detailed in the accompanying paper by Mr. Howse; moreover, the whole subject is well described in 'Paget on Tumours,' and in the recent and elaborate work by Virchow, on 'Tumours,' in the third volume of which, at page 312, there is a most interesting and accurate survey of the microscopical characters.

We will now venture a few words upon the symptoms and diagnosis of our case and of Case 4; for the other cases were readily recognisable as vascular new growths. In these latter cases the skin was involved, and thus the deeper structures were exposed to view, which in the former cases remained covered up by healthy integument.

In Case 1 the patient complained of difficulty in walking, and great pain in the foot, and on examination the foot exhibited a soft elastic swelling on the outer side of the dorsum, over the fourth and fifth metatarsal bones and adjacent intermetatarsal spaces close to the phalangeal extremities. The tumour was soft and elastic, about the size of half-a-crown, not very well circumscribed, although there was a tolerable outline. It was very tender and painful, but the skin over it was quite natural. An accurate investigation could not be made, and the slight indistinct pulsation felt, together with the throbbing sensations, were put down to the inflammatory condition. By rest, and placing the limb in an elevated position, and the use of saturnine lotions, the parts regained their normal condition, barring the presence of the subcutaneous elastic swelling. And on careful manipulation, the tumour appeared to have a remarkably fluctuating feel,

so much so that it was suggested that it might be a chronic abscess or cyst, receiving an impulse from some arterial vessel underneath. It was, therefore, considered advisable to explore the tumour, which was done by means of a lancet, when arterial blood flowed out in a powerful stream, and in faint but decided jets. This at once led us to conclude that we had to deal with a blood tumour; it gave rise to much speculation as to the nature of the disease.

Now, in Case 4 very similar conditions occurred. The history states that three days after the accident a tumour appeared in the direction of the second toe; this, according to the patient's account, was moveable and pulsatile; it increased in size for five months, and then remained stationary. She had consulted several surgeons, and nearly all considered it to be aneurismal; leeches and resolvents were applied, but without benefit. When Dupuytren saw the patient the tumour occupied a considerable part of the dorsum of the foot, but there was no heat, redness, or ulceration of the skin. At first it was thought to be of a syphilitic character, but there was no history to that effect.

The next supposition was that the tumour might be an abscess, behind which was placed the artery, which communicated to the tumour its pulsating movements.

Further on in his report Dupuytren states that on again examining the tumour its diagnosis was less clear; it was uncertain whether it was an abscess in front of the dorsalis pedis artery or an aneurismal tumour. The artery could be displaced without stopping the pulsation in the tumour; this, of course, was in favour of the latter view. An exploratory puncture was made into the centre of the tumour, but only a small quantity of black blood escaped, and not in jets. Here, then, was an essential difference from Case 1, and in all probability this point gave rise to the grounds for considering it to be fungus hæmatodes. It proved to be an erectile tumour.

In this case Dupuytren freely laid bare the tumour, and attempted its removal, without success, and he at once amputated the foot according to Chopart's method. In Case 1 the disease was not so rapidly dealt with, on account of peculiarities in the symptoms which caused less severe measures to be tried before the final removal of the limb. After the

exploratory puncture in our case direct compression was employed to prevent any further hæmorrhage, but this could not be borne long, and had to be discontinued. At this period, too, commenced the pulsation, decided and distinct, although feeble, synchronous with the arterial pulse, and equably diffused over the whole swelling. This pulsation was made evident to the eye by the application of a kind of sphygmograph over tumour. Pressure on the dorsalis pedis artery perfectly controlled the pulsation, and by careful compression the tumour could be emptied, but on taking off the pressure the tumour reappeared and pulsated more distinctly. On manipulation there was an irregular feel about the tumour, as of an enlarged varicose or tortuous convolution. This was not decisive, but it was sufficient to justify the assumption of the disease being a cirroid aneurism. It had all the characters of this disease, except in its situation; being seated at a distance from the larger arteries. M. Gosselin, in the '*Archives Générales de Médecine*,' December, 1867, has published a very excellent monograph on this affection, but unfortunately for pathological instruction the three cases alluded to by him were successfully treated without extirpation or otherwise, so that the actual condition of the disease in these cases could not be verified. However, our case seemed to be akin to these tumours, and since pressure on the dorsal artery of the foot perfectly controlled it, this vessel was ligatured, but the operation proved to be only of temporary benefit, as the disease partially reappeared. Soon after this another complication was found to exist, viz., a similarly pulsating swelling in the sole of the foot, its character and extent not ascertainable in consequence of its depth; this was entirely controlled by pressure on the posterior tibial artery.

It was still conjectured that the disease was associated with the arterial system, and it was thought advisable to ligature the vessel named above the internal malleolus, before its bifurcation, and thus to cut off arterial supply from this source, which not only fed the tumour in the sole, but probably also that on the dorsum.

It may not be out of place to recapitulate the subsequent progress of the case and the measures which were afterwards adopted.

The operation succeeded beyond expectation, and the patient left the hospital; the case being entered as one of cirroid aneurism of the foot, cured by ligature of the different trunks to the tumour. If the patient had been lost sight of, the case would have thus stood upon record.

Fortunately for us, but unfortunately for the patient, she again presented herself at the end of three weeks, with a return of the tumour on the dorsum, pulsating away as freely as any artery, while the tumour in the foot seemed entirely gone, and not a trace of it was to be seen. A large vessel was now found coursing along the outer part of the foot, and leading into the tumour. This came off from the anterior tibial artery; hence it was proposed that the vessel should be tied in the lower third of the leg, inasmuch as pressure on it controlled the swelling. This was done, and good results ensued. Having thus cut off all the main supplies, and caused the subsidence of the tumours, we now congratulated ourselves that we had, at last, brought the case to a successful issue. The patient was instructed to wear a bandage, and to have uniform and moderate pressure on the foot and ankle maintained for some time. All our prognostications proved fallacious, we 'had "scotched the snake, but not killed it;"—for in about three months we found that our labour had been in vain. The tumours reappeared, and the parts were now again in the same condition as before any operation had been performed, except, indeed, that matters were considerably worse. What was the disease which had thus baffled us? It was now considered to be aneurismal, the want of success being attributed to a constitutional defect, a want of coagulating power in the arterial fluid; and with this view the patient underwent a course of acetate of lead treatment, but with no other effect than injuring her health. She was obliged to be sent home into the country to recruit her strength, and was recommended to come to the hospital again to undergo whatever further treatment might be thought advisable.

On the 9th of November, 1866, a little less than a twelve-month after her first admission, she again became an in-patient, with the disease aggravated, and presenting the conditions which are fully described in the report. At this time it was very evident that the convoluted mass on the dorsum

of the foot had a distinct efferent tube passing from it, crossing the dorsum, and mounting up in front of the internal malleolus, in the course of the internal saphena vein. Hence it was conjectured that although this tube distinctly pulsated, yet it was, in fact, the vein itself, receiving arterial blood directly through the tumour from some large arterial vessels; thus constituting a kind of varicose aneurism or arterio-venous tumour. The pulsation was synchronous with the pulse, and attended with a distinct bruit de souffle, but no whiz could be made out by the application of the stethoscope.

Here, again, we were at a loss to account for the tumours in the sole of the foot, otherwise than by considering that the disease, whatever it might be, originated in the sole and extended through the metatarsal spaces of the fourth and fifth toes on to the dorsum. However, it was clearly requisite that some decisive step should be taken. The disease was evidently progressing, the patient suffered much, the limb was rendered comparatively useless, and the bones and neighbouring tissues and tendons were becoming involved.

Thus then, in this case, no accurate and satisfactory diagnosis could be arrived at; and it was not deemed advisable to resort to any further exploratory measures to ascertain the nature of the disease.

In Case 4, as in our case, the surgeon cut off the disease by amputation of the limb; and therefore one is not able to judge of the course and progress which would have taken place had it been left alone; but Cases 2 and 3 assist us as to the probable result. It appears that these vascular growths soon involve the skin, ulceration ensues, hæmorrhage takes place; and that, although easily commanded by slight pressure, this recurs frequently, endangering the life of the patient, and necessitating the interference of the surgeon.

A question arises, viz.: Could the disease in Case 1 have undergone a spontaneous cure by rest and pressure? We think not, for the blood supply was too great to overcome; and the more so because ligature of the main trunk failed. This now brings us to the more material consideration—what was to be done? Here is a young girl on the eve of an important epoch of life, deprived of a limb for ever; why

have recourse to a step attended with such irreparable consequences? Let us seriously enter into the subject to justify our proceedings on the occasion.

No doubt the most satisfactory method would have been complete extirpation of the growth. But, inasmuch as the disease extended from the dorsum into the sole of the foot through the metatarsal spaces, and we were not by any means certain as to the extent of the growth in the sole amongst the muscles, tendons, &c., and moreover as the metatarsal bones were involved and had been hollowed out on either side, permitting the finger to pass through, it was deemed unsafe to subject the patient to this very dangerous operation, which would in all probability, were it to succeed, leave a useless limb. The next point was the question of injections, which have been lately employed with success by MM. Gosselin, Nélaton, and others. The girl was extremely delicate, she showed great want of power, she had incipient curvature of the spine, she was prone to aplastic action, for even the puncture of the tumour in the first instance, soon after her admission, had set up great inflammation and threatened suppurative action. Bearing all these things in mind, and the fact that a very large vein on the dorsum was continuous with the tumour, and having also M. Nélaton's fatal case as a warning, we decided not to inject the tumours with the perchloride of iron. Even if we should succeed, how about the metatarsal bones which were worn away, and the muscles and tendons of the sole of the foot in the reparative process? Considering, therefore, all circumstances, and the anxious desire of the patient and friends to avoid all risks, I elected to remove the limb by amputation, while her health, which was rapidly declining, still permitted us to embrace an opportunity for so doing without risk to life.

It may be asked, and with justice, why we have not in this case designated the disease an "Aneurism from Anastomosis," as advanced by John Bell, inasmuch as the disease presented all the conditions laid down by him in his definition. However, Bell himself was not over-satisfied with the term, and in fact it does not express the true nature of the disease in the present instance, as it in no way indicates that the disease is associated with new growth as well as with

an enlargement of the anastomosing vessels. Let John Bell, however, speak for himself; he says:¹

"That kind of aneurism which I venture to name aneurism from anastomosis resembles those bloody tumours which appear in new-born children, occupying chiefly the lips, cheeks, eyelids, or hairy scalp, and which grow, in process of time, to an important size, bursting at last and bleeding furiously, so as to oblige us to cut them out.

"The disease which I am now about to describe arises, not from any such natural deformity, but from various and hidden causes; it often begins in adults, increasing from a trivial pimple-like speck, to a formidable disease. This aneurism consists in a mutual enlargement of the smaller arteries and veins. I should call it cutaneous aneurism were it confined to the skin, or aneurism of the hairy scalp, if it were peculiar to that part; but *it is an accident which affects indifferently all parts of the body*, and brings on complicated diseases even among the viscera, not less frequently than on the surface of the body.

"This tumour, which I call aneurism by anastomosis, is a perfect aneurism. It arises from some accidental cause; is marked by a perpetual throbbing; grows slowly, but uncontrollably; and is rather irritated than checked by compression. The tumour has only a sort of trembling or indistinct throbbing at first, but when it is fully formed it has a continual distinct pulsation; it beats strongly upon every occasional exertion; it swells up in spring and summer with a fuller and more active pulsation; it beats powerful in the time of menstruation; and by the incessant pulsation and occasional turgescence it forms among the cellular substance, or among the dilated veins, sacs of blood.

"It is not without reluctance and diffidence that I venture to use a new name and a hypothetical one, yet I know of no word by which I can truly express the character of this tumour, except by this word aneurism from anastomosis. I have cut round about such tumours in the living body, and dissected them out; I have seen others cut into the substance of those tumours in the way of operation, thinking perhaps to

¹ Bell's 'Surgery,' 4to, Edinb., 1801, vol. i, p. 456. Discourse XI, "Of the Aneurism from Anastomosis."

obliterate some dilated veins or some particular artery; and finally, I have dissected and observed such tumours after they were extirpated, and cannot be entirely mistaken in regard to their nature. The tumour is a congeries of active vessels, and the cellular substance through which these vessels are expanded, resembles the cellular part of the penis, the gills of a turkey-cock, or the substance of the placenta, spleen, or womb. It is apparently a very simple structure that enables those parts (the womb, the penis, the spleen) to perform their functions, and it is a very slight change of organization that forms this disease."

Dupuytren,¹ on the 6th of June, 1825, read a paper before the Academy of Sciences on a case of dilatation of several arterial trunks and branches of the scalp, where he refers to his having been the first to propose the name of "erectile" tumours, not only for those dilatations to which he was then alluding, but also for those unfrequent dilatations of arterial capillaries in the substance and in the neighbourhood of the skin.

Since that time he has entered more fully into the subject, and has published a very elaborate description of these tumours in his '*Leçons Orales de Chirurgie Clinicale*.'

After giving an account of the erectile tissue as existing in a normal state in the human subject and in animals, he passes on to say that "this tissue is the model or type of a multitude of accidental tissues, which in consequence of defects, either original or acquired, may be developed in almost any part of the human body, where they produce tumours, which frequently attain considerable size. These tumours possess, in a more or less evident manner, the organization and properties of natural erectile tissue. He denominates the disease "accidental erectile tumours." Such growths all exhibit the same vascularity and organization, the same investment and the same fibrous interlacement, as the natural erectile tissues do; but their investment is weaker and the quantity of nerves in them is less.

Under some circumstances the accidental erectile tissue

¹ '*Répertoire général d'Anatomie et de Physiologie pathologiques*,' tom. vi. '*Leçons Orales de Chirurgie Clinique*,' 2^dme édition, tom. iii, p. 202, 1839. See also Cooper's '*Surgical Dictionary*,' new edition, 1861, vol. i, p. 234.

seemed to Dupuytren to be the product of a degeneration of some natural texture and of the dilatation of its capillary network; while in other instances it appeared to him to be in reality and essentially a new growth, pervaded by a congeries of blood-vessels and developed amongst the parts. In the first case it is confounded on every side with the healthy textures; in the second it separates these textures from one another, compresses them, and at the same time remains divided from them by a dense investment of areolar tissue, by which it is circumscribed.

The term "erectile" tumour is the one generally adopted by the French surgeons as sufficiently indicating the nature of the lesion, although the analogy between these accidental growths and the natural erectile tissues appears to them to be somewhat forced; but the name, they say, has the advantage of being brief.

Mr. Paget seems also inclined to retain this term, and in his second edition, page 560, he observes:

"The name 'erectile tumour' has, of late years, come into general use, as expressing a principal fact concerning these diseases, viz., that many of them resemble very closely in their texture that of erectile or cavernous tissue. Dr. Humphry ('Lectures on Surgery,' p. 111) has, indeed, rightly objected to the use of the term, that these tumours present no imitation of the erectile tissue in the power of filling themselves with blood, as if by some internal force. But, since this occurrence in the true erectile tissue depends as much on the accessory structures of nerves and muscles as on the tissue itself, we may fairly apply the term 'erectile' to the tumours, remembering only for this, as for other structures occurring in tumours, that the imitation of the natural tissue is imperfect or partial. However, if any be scrupulous in the use of these terms, they may call these tumours vascular, or cavernous, or even telangiectasis. The likeness which these tumours bear to the erectile tissue, as exemplified in the corpus cavernosum penis is sometimes, in general appearance, perfect."

Virchow in his recent work on '*Die krankhaften Geschwülste*,' band iii, hälfte i, seite 306, has substituted the name angioma as more expressive. He objects to the term angionoma used by Dr. Hughes Bennett in his work on '*Medicine*,'

4th edit., 1865, p. 216, and adopted by M. Follin in his 'Traité de Path. Ext.,' tom. i, p. 204, as one which is etymologically incorrect.

This term seems to be a very wide one, for on referring to its definition in the 'Dictionnaire des Sciences Médicales,' vol. 5, p. 103, M. Cornil thus describes it—"Angiome, angionome (ἄγγειον, vessel), a tumour consisting essentially of vessels of new formation. There exist several varieties according as these vessels are capillaries, arteries, or veins, or as the morbid tissue has the properties and the structure of erectile tissue." Angioma includes, then, all the varieties of *nævi materni*, fungus *hæmatodes*, and erectile tumours; and besides, many authors arrange under this class of tumours dilatation of arterial vessels, and all the varieties of aneurism.

Virchow, no doubt, in accepting this term, found some difficulty in its appropriation, and therefore sets out by excluding a certain class of vascular or blood tumours: thus, he states that "angioma has uncertain boundaries, and one must, therefore, exclude *hæmatoma*, a swelling formed of vessels containing blood, and *hæmatoma ecchyoma*, that consisting of extravasated blood."

At page 308 op. cit. he remarks:

"Strictly speaking, this name should be confined to those tumours which essentially consist of newly formed vessels, or of vessels with newly formed elements in their walls. We thus exclude those cases in which partial bulgings out or dilatations of single trunks form tumours; particularly the simple aneurisms and varices. Even then the limit is not so defined as one might suppose. In fact the development of tumours which arise from a new formation of vessels (or, as Hasse terms them, *Gefässwucherungen*) approaches so near to the simple dilatation of vessels (*angiectasis*) that on the one hand dilatation of the vessels generally exists in these tumours, and on the other hand in most persistent dilatations of the blood-vessels there is, at the same time, an addition to their wall elements. Thus the two conditions so approach each other that there are, in fact, certain forms in which it is scarcely possible to say whether the structure should be placed in the category of true new growths or not,—in which, indeed, no line can be drawn. The clearest case is naturally

where it implicates the smaller divisions of the vascular apparatus, where the tumour is essentially seated in the capillaries, or in the form which Gerdy ('Union Méd.,' 1852, Juillet, No. 88) calls 'tumeurs vaso-capillaires.' I do not by this mean to imply that such a tumour always springs from a change in the capillaries, but that it is found in the situation of them and takes their place. The capillaries at the spot no longer exist, but their place is taken up by a certain development of vessel-spaces or cavities filled with blood. Closely allied to this is a second variety, the telangiectasis or the simple angioma, where the capillaries undoubtedly still exist, and are mostly much dilated; but also have marked changes in, and often considerable thickening of, their walls. At the same time, the other vessels are involved, sometimes the arteries and sometimes the veins, the capillary system being nevertheless also affected."

For the last 100 years these tumours have been mixed up with fungus hæmatodes; thus Maunoir in his 'Mémoires,' Paris, 1820, says, "Réservant le terme de fungus hæmatodes pour les tumeurs vraiment sanguines et vasculaires, c'est à dire entièrement composées d'un lacis inextricable de vaisseaux sanguins réunis par une tissue lâche, formant un ensemble d'un aspect spongieux."

Dupuytren, as we have already observed, called the true vascular tumour "*erectile*;" and gave the name of "fungus hæmatodes" to those swellings in which the erectile tissue was combined with cancerous material. Boyer, in vol. ii, 'Traité des Maladies Chirugicales,' Paris, 1819, has accurately described those forms under the name "Tumeurs fongueuses sanguines congénitales" and "Tumeurs fongueuses sanguines accidentelles."

Schuh ('Pseudoplasmen,' Wien, 1854) again introduced terms, which have increased the perplexity, by naming them "Blutschwammen, fungus vascularis, tumor spongiosum:" terms just as bad as fungus hæmatodes.

Taking into consideration all the above terms we may still retain the word "*erectile*" as being more comprehensive and more in accordance with our practical knowledge of the disease; and hence this is the term used in the present instance, in preference to the term angioma.

But in our case we should certainly advise the term "arterio-venous" to be appended to the word erectile, inasmuch as the new growth was intimately associated with both arteries and veins: so that the disease will be most appropriately denominated "*arterio-venous erectile tumour*."

Again, the arteries and veins forming the afferent and efferent vessels to the tumours in the present case were remarkably large and altered in character and structure—they assumed conditions very frequently met with in arterio-venous aneurisms, comprising the so-called aneurismal varix and varicose aneurism, as also those forms of vascular tumours in the scalp and elsewhere, where in some instances, independently of the arteries, the veins are enlarged and varicose, constituting the venous nævus or vascular venous tumour; and others, again, where the arteries are enlarged and convoluted, forming a sort of cirroid condition independent of the veins, and constituting the arterial nævus or arterial vascular tumour. Here we had both these conditions combined, but especially there were enlarged veins on the dorsum and in the sole, which, like all veins that receive arterial blood direct from the artery without transmission through capillaries, became enlarged, tortuous, and thickened, assuming all the characters of an arterial tube. Then, again, the arteries had undergone changes which were noticed early in the disease, for at each operation of tying the dorsalis pedis, posterior and anterior tibial arteries, they were found enlarged to nearly double their natural size, more thinned and more like veins in structure, so that the surgeon had to be careful in tightening the ligature.

Mr. Howse has given a very accurate account of the conditions met with in our case: I shall not therefore enter further upon the nature of the disease, but I will only remark, in conclusion, what appears to me to be the true explanation of the morbid appearances. I believe that in the first instance the vascular, cavernous, erectile, new growth was developed in the vasa vasorum of the coats of the deep venæ comites in the sole of the foot, as well as of the communicating veins between the sole and the dorsum; that these tumours and their contained spaces communicated directly with the veins and held venous

blood ; that the disease was set up by the accident received ; and that subsequently the arterial vessels became implicated, so that arterial blood flowed directly into the hollow spaces and from thence into the veins, the veins thus receiving arterial blood.

THE ANATOMY AND MICROSCOPICAL STRUCTURE

OF

MR. POLAND'S SPECIMEN OF ERECTILE TUMOURS
OF THE FOOT.

By H. G. HOWSE, M.S.

THE following is meant as a sequel to Mr. Poland's paper on the same subject. To that paper I wish, therefore, to refer the reader for the history of the case, and Mr. Poland's comments on the same, and shall without further preface proceed to the matter in hand.

DESCRIPTION OF THE DISSECTION OF AN ERECTILE TUMOUR OF THE FOOT.

Method of preparation.—It was injected from the arteries with size coloured red; tubes were inserted into the anterior and posterior tibial and peroneal arteries,—the injection flowed most readily by the peroneal, and returned by the veins,—so that both kinds of vessels were alike coloured red. This would indicate that the peroneal artery was the principal vessel through which the circulation of the limb had been maintained after the operations on the other arteries. After injection the limb was put to soak in spirit.

In the following description I shall state, as I proceed, what I regard the various vessels to correspond with in a normal dissection, though the reason why may not appear very clear to any one reading it for the first time. I hope, however, as I proceed the difficulties will clear up.

Anterior part of the leg and dorsum.

Superficial vessels of the dorsum.—The cutaneous arch of veins across the dorsum, terminating in the internal and external saphenous on either side, is easily recognisable. The internal saphenous is formed in the usual manner, viz., by a branch from the inner side of the great toe, by a communication with the arch above mentioned, and by two or three branches coming up from the side and sole of the foot. It is of large size—much larger than usual; opposite the internal malleolus there is a small tumour developed upon its wall, about three eighths of an inch in diameter, and presenting the same structure, on section, as those presently to be described. It seems to be totally unconnected with any special arterial supply. The external saphenous is comparatively of small size, and takes its origin as usual. The arch receives the digital veins; upon one of these, which drained the blood from the third and fourth toes, there is a swelling two inches long, by three quarters of an inch broad. It is irregular in shape, somewhat lobate, and seemed at first to be formed of a mere dilatation of the vein [*vide* drawing of dorsum]. It is filled with injection, and communicates with the sole of the foot by a vessel which appeared more like a continuation of the growth than anything else, so irregularly knotted and twisted are its walls; this vessel passes downwards just at the cleft of the little and fourth toes. The tumour also apparently communicated with the sole through the second and third interosseous spaces. A more detailed description of the nature of the swellings will be given presently.

Deep structures of the anterior part of the leg and dorsum.—At the upper part of the leg, between the tibialis anticus and extensor proprius pollicis, three considerable trunks exist; one of these, about three inches down the leg, apparently terminates in the muscles; this I regard as one of the venæ comites of the anterior tibial artery, the continuity of which has been destroyed at the site of ligature; it is not represented in the drawing. A second runs down to the front of the ankle, where it forms a complicated series of arches, with other branches to be presently described. This is the second vena comes of the

anterior tibial artery; it is represented in the drawing as Vat 2. The third trunk (the anterior tibial artery itself) is placed between the other two, and runs also to the front of the ankle. About half way down the leg it apparently gives off a branch which runs in company with it to the ankle, and there joins in the series of arches mentioned as derived from the second anterior tibial vein. Have we then here a direct communication between arteries and veins? Not at all. On tracing out the *canal* of the anterior tibial artery, we find that it is obliterated about three quarters of an inch above the apparent origin of the branch, and again for half an inch below it; in like manner, the apparent branch is obliterated for half an inch from its origin. We have here then probably the site of ligature of the anterior tibial artery, and the apparent branch is the vena comes, which pieces on to the upper venous trunk described above, and which has become adherent to the artery at the site of ligature.

We shall follow now the *course of the anterior tibial artery*, and its continuation the *dorsalis pedis*, leaving the description of the veins to be finished presently. It runs as usual over the arch of veins to the first interosseous space, where it dips down into the sole. Just above the interosseous space the canal of the artery has become obliterated; this is the site of ligature of the *dorsalis pedis*; on each side the *venæ comites* of the artery have become adherent to it, though their canals are not obliterated.

Branches.—The first below the site of ligature is a very large trunk, given off just over the anterior ligament of the ankle-joint, and evidently the one by which the blood has found its way back into the *dorsalis pedis*, &c., after the ligature of the anterior tibial. It represents a common trunk from which the external malleolar, tarsal and metatarsal arteries spring. The arrangement of the vessels, therefore, is not that usually met with in the normal subject. It turns outwards, and almost immediately divides into two branches, the upper of which is the external malleolar; the lower soon divides again into the tarsal and metatarsal arteries. The *external malleolar* divides again into two main branches, each of considerable size; the lower one runs superficially over the origin of the *extensor brevis digitorum*, and anastomoses with the termination of the peroneal artery

on the outer side and posterior part of the foot, and also with branches of the external plantar artery; the upper runs backwards and upwards over the external malleolus, and finally anastomoses by a large branch with the anterior peroneal. The *tarsal artery* runs outwards about midway under the extensor brevis digitorum, receives some large communicating branches from the external malleolar, and finally also anastomoses on the outer side of the foot with some large branches of the external plantar artery, and terminations of the peroneal trunk. The *metatarsal artery* is that which more particularly supplies the tumour of the dorsum. It runs forwards and outwards, becomes placed superficially to the tendons, and finally ends in two branches which directly supply the growth with blood. The remaining branches are the small ones for the first interosseous space and great toe; also a muscular branch which is given off to the extensor brevis digitorum, just above the obliteration of the trunk of the *dorsalis pedis*; this artery, on account of the atrophied state of the main trunk below it, appears like the continuation of the vessel. These branches require no further comment. It will thus be noticed that nearly all the largest anastomoses for the restoration of the circulation are upon the outer side of the foot with the terminations of the peroneal artery. This is probably due to the disturbing influence upon the nutrition of the part exerted by the operation for ligature of the posterior tibial behind the inner malleolus.

Resuming now *the description of the veins*, we find that in nearly every case two *venæ comites* accompany each branch of the artery. In front of the ankle-joint the two *venæ comites* of the anterior tibial artery form an arch underneath the vessel, which arch receives the vessels corresponding with the common arterial trunk before mentioned as given off from the anterior tibial artery in this situation, viz., *venæ comites* corresponding with the external malleolar and with the tarsal arteries. In addition, it receives two *venæ comites* which accompany the *dorsalis pedis* (not represented in the drawing) and two connecting branches which run directly into the internal saphenous in front of the inner ankle. There are no veins corresponding to the metatarsal artery; the blood from the tumour seems to have returned wholly by the large internal saphenous. The vessels accompanying the external malleolar and tarsal arteries

are connected by cross branches, so as to form smaller arches amongst themselves.

Posterior part of the leg and sole.

Arterial supply.—Between the superficial and deep layers of muscles there are three main vessels. Of these the central one is the posterior tibial artery; the two lateral ones clearly correspond to its venæ comites. Following first the artery, we find that just behind the inner malleolus it becomes connected with one of the accompanying veins, apparently throwing itself into it. This, however, is only an apparent junction. On examining the canal of the artery it is found to end as a blind sac at the point of union, the cavity of the veins, on the other hand, being pervious all the way down. About half an inch lower down there is a blind end of a vessel, which is loosely bound on either side by connective tissue to the surrounding veins. From its structure this is apparently artery; its canal does not communicate with either of the vessels on each side. We have thus a gap of half an inch long, formed between two blind arterial canals; this is the point of ligature of the posterior tibial. The continuation of the arterial trunk goes into the sole of the foot under an arch of veins formed by a transverse branch between the venæ comites. It almost immediately divides into two branches, of which the largest trunk takes the course of the *external plantar artery*. This artery runs on the deep surfaces of the abductor pollicis and flexor brevis digitorum to the base of the fifth metatarsal bone. At this point the continuation of the artery onwards seems all to have been absorbed by the tumours of the sole. It gives three short branches to them, which correspond with the three superficial divisions in the growth (for these are all completely continuous with each other in the hollow of the metatarsal bones). The plantar arch has, therefore, not been followed to the first interosseous space, for it is apparently upon this part of the artery that the growth has developed itself; at any rate, it occupies nearly the whole space taken up by this arch.

Branches.—The first is a medium-sized artery running under the abductor minimi digiti and extensor brevis digitorum to join in the numerous anastomoses on the outer side of the foot. This artery must have very considerably contributed to restore the circulation in the foot after the ligature of the posterior

tibial. Another large branch is sent off, just before the artery turns inwards, to the outer side of the little toe and contiguous sides of the little and fourth toes. This vessel, at the cleft of the above-named digits, is continuous with the prolongation of the dorsal tumour, previously described as sent down into the sole at this point. It is worthy of note that the vessel-walls of the whole of this branch of the external plantar are, as it were, developing into small erectile tumours. They have a knotted serpentine appearance, and are much thickened. A section shows clearly erectile tissue developing upon the arterial walls. The remaining branches of the vessel are as usual; they have nothing to interest us in this case. The *internal plantar* artery appears as a separate trunk behind the internal malleolus. It takes its usual course between the flexor brevis digitorum and abductor pollicis, and at the base of the metatarsal bones supplies a considerable branch to the innermost of the three tumours. The artery terminates in the usual way, and has nothing more of interest.

The question now arises—In what way was the arterial supply of the foot maintained after the ligature of the posterior and anterior tibial and dorsalis pedis arteries? The vessel next to be described answers the question. Although not covered in by any of the fibres of the flexor longus pollicis, yet it runs so close to the usual position of the peroneal that we may quite correctly give it that name.

Peroneal artery.—Descends at first along the inner border of the flexor longus pollicis and over the fibres which take their origin in common with the flexor longus digitorum. Passing superficial to the flexor longus pollicis, it terminates, as usual, on the outer side of the foot, inosculating with the external malleolar and tarsal arteries. Before passing behind the external malleolus it sends off its anterior peroneal branch (here very large), which runs down a short distance on the interosseous membrane, then pierces it and terminates by anastomosing in front, more especially with the external malleolar artery. This termination of the artery has been before noticed. About half way down the leg, before giving off its anterior branch, the peroneal trunk sends off a considerable branch, which joins with an artery not generally seen in ordinary anatomical subjects. This is one descending on the posterior tibial nerve, and which

we may call comes nervi tibialis postici. It is undoubtedly an enlargement of one of the large nutrient arteries seen in any microscopic examination of a large nerve. It runs down on the nerve to within three inches of the ankle-joint, when it receives the above-mentioned branch from the peroneal. It almost immediately divides into two branches, both of which run on to the external malleolus and aid in keeping up there the considerable chain of anastomoses before described. A smaller vessel runs on the nerve behind the internal malleolus into the foot.

It is, then, through the peroneal artery and this comes nervi tibialis postici that the whole vascular supply of the foot has been kept up. It is impossible not to notice, in examining the size of the vessels, the apparent inadequacy of those mentioned to the work on hand. The combined diameter (allowing for the shrinking that they would all undergo by the size injection and the soaking in spirit) is not more than the obstructed posterior tibial artery alone shows.

Veins.—Two venæ comites accompany the posterior tibial artery; by a transverse branch they form an arch behind the internal malleolus. This arch receives, by a branch on the inner side of and below the internal malleolus, a vein from the internal saphenous. It also receives venæ comites corresponding with the external and internal plantar arteries; these veins are varicose and exceedingly thin-walled. The veins corresponding with the *external* plantar artery receive the blood from the outer side of the tumours, and are rather the largest; those corresponding with the *internal* plantar artery receive the blood from the inner side of the growth, and part of it (as in that of the dorsum) seems quite continuous with one of these veins, the vessel appearing to be merely swollen out, and the walls exceedingly thin and varicose. There are several venous anastomoses on either side of the foot, but more upon the outer than on the inner, between the veins on the dorsum and those on the sole. The remaining branches are of little interest.

Description of the tumours.—I have already mentioned the size, shape, and position of that on the dorsum. It remains only to do the same for the swelling of the sole. It may be roughly divided into three parts, but it should be understood that, though these appear rather distinct in the drawing, they are really very closely connected together at the base, the

apparent division being only due to a superficial lobulation. The growth commences opposite the cuboid end of the os calcis, and extends forwards to the phalangeal extremities of the metatarsal bones. Transversely it extends across all that part of the foot comprised in the space between the first and fifth metatarsal bones. It has been already mentioned that in the fourth interosseous space, and on the outer side of the little toe, the growth extends forwards on the digital arteries as far as the cleft of the toes. The main tumour is deeply placed completely in the concavity of the metatarsal bones, and is covered in by the flexor brevis and tendons of the flexor longus digitorum. Its surface presents a knotted wavy appearance, with large serpentine and varicose vessels running over it. Although apparently without any organic connection with the metatarsal bones, yet it is so firmly fixed as to be immovable upon them, and it seems quite certain that the growth in the sole and that on the dorsum communicate through the second and third inter-osseous spaces. As, however, a model is being taken of the preparation, this point cannot be quite satisfactorily dissected at present. The shafts of the metatarsal bones, more especially those of the second and third, have been considerably thinned by the pressure of the growth, thus deepening the concavity of the sole. I have already made mention of the growth existing on the walls of the internal saphenous vein opposite the internal malleolus. At first it appeared like a mere varicosity, but a section showed that it was formed in a similar manner to the larger ones. We have thus new growths forming on the walls of both kinds of vessels, arterial as well as venous; upon the digital arteries from the external plantar in the sole, and upon the internal saphenous vein behind the malleolus. This shows our case to be very unlike any of those previously described, where such growths seem generally to form upon the walls of veins. Both the tumours of the dorsum and sole were separated from the tissues overlying them by a very definite layer of connective tissue. The muscles covering in that of the sole were pushed aside and atrophied, but were intact. We shall return to this part of our subject in speaking of the probable origin of the growth, after we have given an account of the microscopical examination.

From the above general description it will be seen that to

have excised the tumours (the only other method of procedure possible besides amputation) would have necessitated laying open the sheaths of the tendons extensively, besides dividing various muscles of the sole. It is very doubtful if even then it would have been possible to remove all the growth extending between the interosseous spaces, while the hæmorrhage, in case it was cut into, would have been serious. When, in addition, the new growths upon the digital arteries and internal saphenous vein are taken into account, it is apparent that any other mode of treatment than amputation must almost necessarily have been attended with a recurrence of the disease, even if the inflammation and suppuration consequent upon such treatment had not previously necessitated amputation.

MINUTE EXAMINATION OF THE GROWTHS.

On cutting across the tumours transversely we find that they are all composed of a large number of spaces, some circular, like the sections of vessels cut transversely, some oval, beside other larger ones of very varying shapes. The intervening material appears made up of a loose tissue, which, in this preparation, has a gelatinous appearance, from the nature of the injection. The larger spaces are filled with red injection, the smaller ones with simple size, as if all the colouring matter had been filtered out and retained in the larger spaces before reaching the smaller ones. In the present injected state the tumours have a very firm consistence.

It was desirable to ascertain the exact relation of these vascular spaces to both veins and arteries. In the case of the veins the tumour on the dorsum was selected as that most convenient for examination. The canal of the vein was traced by slitting it up; it was then found that the first part of the swelling consisted merely of a wide dilatation of the vein, the coats of which became excessively thin; beyond this first wide dilatation there was an appearance of a septum; more internally the septa became very perfect, and much more numerous; at this point bristles could be passed from the space which was continuous with the vein into the various trabecular spaces with the greatest ease; thus the veins communicate directly with the various trabecular spaces. In the case of the arteries

the tumour of the sole was selected for examination at the point where the external plantar artery entered it on the outer side of the foot. Tracing the canal of this vessel, it was found to present a minute orifice just at the point where the growth began on the outer wall. It appeared very like an enlarged nutrient artery to the wall of the vessel—in this case supplying the growth with blood; it was, however, too minute to trace out. Farther on, the main vessel underwent a slight constriction, and then expanded immediately into one of the vascular spaces above mentioned. We thus see that the arteries communicate directly with the vascular spaces; this will sufficiently account for the pulsation observed in the growth. No phlebolithes were found in the trabecular spaces in this case; these have principally been formed in similar growths connected with veins only, and which did not pulsate; it is probable that they arose from some alteration in a deposit of fibrin occurring in the vascular spaces, the deposit taking place on account of the slowness of the circulation in such growths. In this case the greater rapidity of the blood-flow, as shown by the pulsation, and the direct connection of the arteries, would tend to prevent any such deposit of fibrin.

A section cut from the loose tissue intervening between the vascular spaces showed, with a magnifying power of fifty diameters, an appearance like that seen in Pl. I, fig. 2, viz. numerous spaces, some filled with clear transparent gelatine, others obstructed with a more yellow material; this yellow material, more highly magnified, proved to be merely the red corpuscles of the blood aggregated together, and probably driven by the injection into the more remote vascular spaces. The margin of each of the larger vascular spaces was formed by a darker and more condensed band of tissue; that of the smaller was exceedingly thin, and looked more like the limiting membrane of a fat-vesicle than anything else; the occurrence of heaped-up blood-corpuscles in some of these spaces proved, however, unquestionably their nature. The substance filling up the groundwork of the growth, between the vascular spaces, was made up of wavy and parallel bands of fibres. With a higher magnifying power (300 diameters) these wavy bands resolved themselves, especially in preparations which had been soaking for some time in glycerine, into fibres of a diameter

varying between $\cdot 001$ and $\cdot 0002$ inch, mostly running parallel to each other, but here and there interlacing where the vascular spaces were scattered more thickly. In intervals between the bundles sections of similar fasciculi were easily to be made out, the diameter of the individual fibres composing them varying according to the sizes stated above. Some of the larger fibres presented an appearance of transverse striation; the nature, however, of these elements will be stated more precisely in the next paragraph. The dark margin of the spaces appeared to be composed of small spindle-shaped cells, which showed some tendency to peel off into the blood cavity. They were oval in shape, very small, certainly not above $\cdot 00015$ inch in diameter at their widest part, and prolonged, more especially at one end, into a long tail. They lay parallel to one another, forming concentric circles around the spaces; beyond this, however, the manner of their arrangement could not be very well ascertained. It is scarcely possible to say whether these cells represent an epithelial lining to the spaces or not. No other epithelium could be detected, either *in situ* or after maceration; it should be remembered, however, that this preparation was not put into our hands until more than two years after amputation, during the whole of which time it had been soaking in spirit; the size injection, again, may have had some effect in displacing the epithelium. We are inclined to think that these spindle-shaped fibres rather represent embryonic cells from which the unstriped muscular fibres may afterwards develop themselves than the epithelium of the spaces.

To ascertain more precisely the elements which compose the growth, pieces of it were soaked in 20 p. c. diluted nitric acid, and examined at intervals of from one to five days. The fibrous elements then separated readily. Most of the larger ones were now seen to be transversely striated, yet in very different degrees of perfection. In some the striæ were as distinctly marked as in the best specimens of voluntary muscle; in others they were but indistinct. This difference did not correspond with the diameter of the fibre, for in some of the smallest fibres the striation was as distinctly marked as in the larger, while, on the other hand, in many of the larger the striæ were not so plainly visible as in the smaller. In the separate state the *size* of the fibres could be studied much more effectually than by sections.

The largest perfectly striated fibre that could be found measured $\cdot 0017$ inch in diameter; the smaller shaded off by insensible degrees into the unstriated fibre. Some of them were branched. Thus, in size, form, and general appearance, they resembled those of the face, tongue, and heart, rather than those of the limbs. Mingled with the striated, the tumours contained a large amount of pale fibre similar to that occurring in other parts of the body, save that great differences were seen in their size. The rod-shaped nuclei, too, were only distinct in parts. How far this, together with the different degrees of plainness in the striated fibre, was due to the long maceration in spirit, we are not prepared to say; we are, however, inclined to think that the appearances described are due rather to different degrees of development of the muscular elements. The study of a growth of this kind opens the whole question of the mode of development of voluntary fibre, and I can only regret that it did not come in a fresher state into my hands, when the result of my examination would have been more conclusive. One observation, however, demands comment. Apparent intermediate gradations were observable between the two varieties of fibre. Thus, in some of those with the largest diameter, but in which transverse striation was not very distinct, the fibre was splitting at the end into fibrils very different from those ordinarily seen. They were very small in diameter, apparently pointed at one end, and with the wavy or crenulated margin frequently seen in involuntary fibre acted on by dilute nitric acid. The appearance of striation was apparently due to the crenulations of each separate fibril interlocking and corresponding. But between the appearance of striation given by this mode of formation and that seen in the most perfect specimens of fibre, there was, at any rate, in this growth, a mere question of degree. We would, therefore, suggest that the one is a mere stage of the other, and that the ultimate fibrils of the more perfectly striated fibre correspond with single cells of the unstriped variety.

Besides the muscle, numerous elastic elements and, in a less degree, wavy bands of white fibrous tissue were present; these formed the connective tissue of the growth; they do not require further description.

The small tumour upon the internal saphenous vein demands a word or two of notice. It was chiefly formed by a varicosity

of the vein, the wall of which was, however, thickened, and in its substance there were vascular spaces developing themselves, the largest of which was filled with coloured injection, thus showing that it must have communicated with the cavity of the vein (which was also filled with injection), or with the artery by an aperture large enough to admit the coarse colouring material used. It most probably received it from the vein, for no direct arterial supply was traced to it. The muscular elements of the walls were much more numerous and better developed than usual; there was no striated fibre.

The question now suggests itself—From what structures was the growth originally developed? We think that the foregoing account must have already shown that it was from the walls of both arteries and veins. The occurrence of the young growths springing up unconnected with any other structure on the walls of the digital arteries and the internal saphenous vein can leave no doubt upon the subject. It is therefore a disease more especially connected with the vasa vasorum, by a mere dilatation of which the vascular spaces were, probably, in the first instance formed, the surrounding muscular elements undergoing at the same time a rapid hypertrophy and multiplication. But what is the origin of the striated muscular fibre? We believe this is the only recorded case of its occurrence in an erectile growth on the limbs, and therefore may be excused dwelling a little longer upon the subject. We think that it is formed by a development of the germinal fibre-cell, though in what way this comes to pass is not quite certain; we have, however, already indicated one possible mode in which this may take place. But another supposition is possible, viz. that it is the remains of a pre-existing structure—of some muscle which this growth infiltrated. Against this view, however, we have several facts.

1. The growth, at any rate by its superficial surface, was separated from the muscles by a pretty definite layer of connective tissue; and though this cannot so positively be asserted of the deep surface, as little remained of the interossei, yet it is more probable that they were wasted by the long-continued pressure than infiltrated by a form of growth which, as usually seen, has very little tendency to invade the neighbouring structures.
2. The diameter of the fibre did not correspond with that usually seen in the voluntary muscles of the limbs. The fibres of the

latter are usually of a tolerably uniform diameter; it is quite exceptional to meet with one below $\cdot 0017$ inch; this, however, was the size of the largest fibre found in the growth, while the majority were very much smaller; moreover, there was no uniformity in their diameter; they varied exceedingly, out of a dozen fibres scarcely any two would be precisely of the same size. We have repeated lately the measurements of fibres taken from all the muscles of the sole of the foot, and we can support the statement that they have the same diameter as the muscular fibres of the limbs generally. The striated fibre, therefore, found in this growth differs most essentially in size from that ordinarily seen in the muscles of the sole. 3. The occasional occurrence of a branched fibre shows a structure exceedingly unlike that found in the voluntary muscle of the limbs, and would rather indicate an affinity with that of the tongue and heart. 4. There apparently existed transitional forms between the two classes of fibre.

For these reasons I think that the striated fibre is probably, not the residue of any pre-existing voluntary muscle, but a new growth, or rather a development from the pre-existing involuntary fibre-cells of the vessel-walls. I would suggest, too, that the more perfect development which the fibre showed in this case may have had something to do with the large amount of arterial blood directly supplied to the part, since it seems reasonable to suppose that a purer and more nutritious pabulum may contribute to the more perfect development of a part.

It is remarkable that, though such a large amount of arterial blood must have been cut off at different times by the ligation of the principal vessels of the limb, yet no part of the tumour was found degenerating. It might have been expected that some part would have been in a state resembling the cystic or adipose degeneration so often found in an old *nævus*; but it was not so, all seemed in a state of most active growth.

Is it possible that the muscular fibre may have had anything to do with the pulsation, which went on so actively in the growth? That the stimulus of the arterial blood sent to the part may have caused the fibre to contract after each cardiac systole? If so, we have an explanation of the rapid return of the pulsation after the operations, when the supply of blood from the peroneal artery, &c., seemed so inadequate to maintain it.

DESCRIPTION OF THE PLATES.

Plate I, figs. 1 and 4, especially the latter, must be regarded as semi-diagrammatic representations of the foot after dissection. In the small space allowed it was not easy to show all the structures; several of the veins, therefore, with the smaller arterial branches and anastomoses, have been left out.

Fig. 1. At = Anterior tibial artery.

Vat 1 = One of the anterior tibial veins adherent to and apparently coming off from the artery. The point of adhesion to this vessel marks the place of ligature.

Vat 2 = Second anterior tibial vein; in front of the ankle it becomes connected with the preceding by a transverse branch.

D = Dorsalis pedis artery.

Js = Internal saphenous vein, smaller and less varicose than as it really appeared.

ES = External saphenous vein.

Em = External malleolar artery.

T = Tarsal artery. The numerous anastomoses of the two latter vessels on the outer side of the foot are not represented.

M = Metatarsal artery coming off from the tarsal.

B = Connecting branches between the internal saphenous vein and the venous arch in front of the ankle-joint.

Fig. 2. Section from part of the tumour of the sole magnified 50 diameters, showing the vascular spaces.

Fig. 3. One of the above spaces more highly magnified (170 diameters), showing the heaped-up blood-corpuscles contained therein.

Fig. 4. This drawing is meant to show the extent of the growth in the sole. It is, however, not represented broad enough, and appears too superficial. Part of the tumour has been dissected off and pinned aside, so as to show it more fully.

P = Posterior tibial artery.

Ptv = Posterior tibial veins.

Ep = External plantar artery supplying the growth. (The three divisions are too plainly marked.)

g = Growths on the digital branches of the above.

Ip = Internal plantar artery.

Y = Erectile tumours of the sole.

Plate II.—These two figures are taken from the, as yet, uncompleted models executed by Mr. Towne. They were photographed in the first place, and reduced from the photograph. They represent the foot before it was completely dissected, when only some of the superficial structures had been removed.

The letters refer to the same structures as in the preceding.

Fig. 2

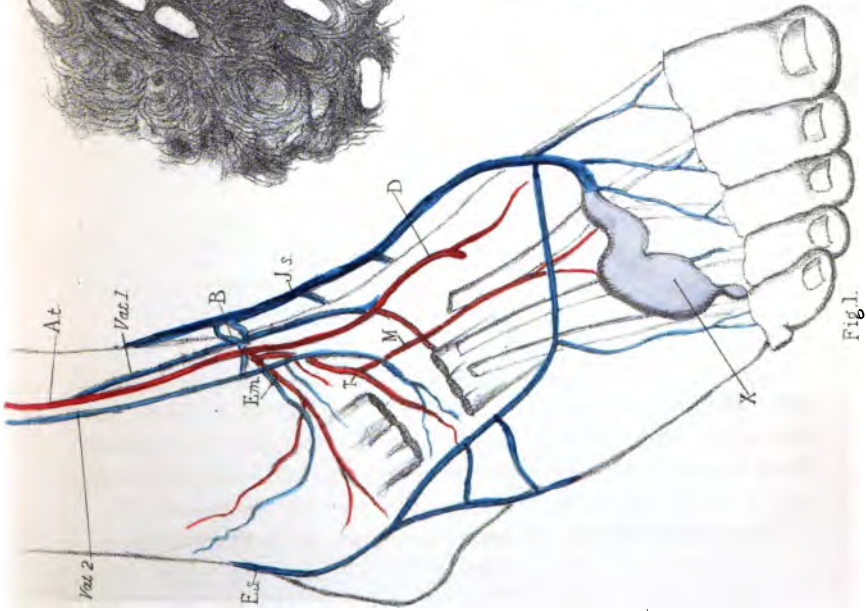
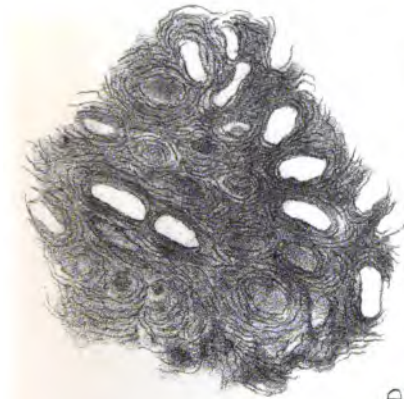


Fig. 1.

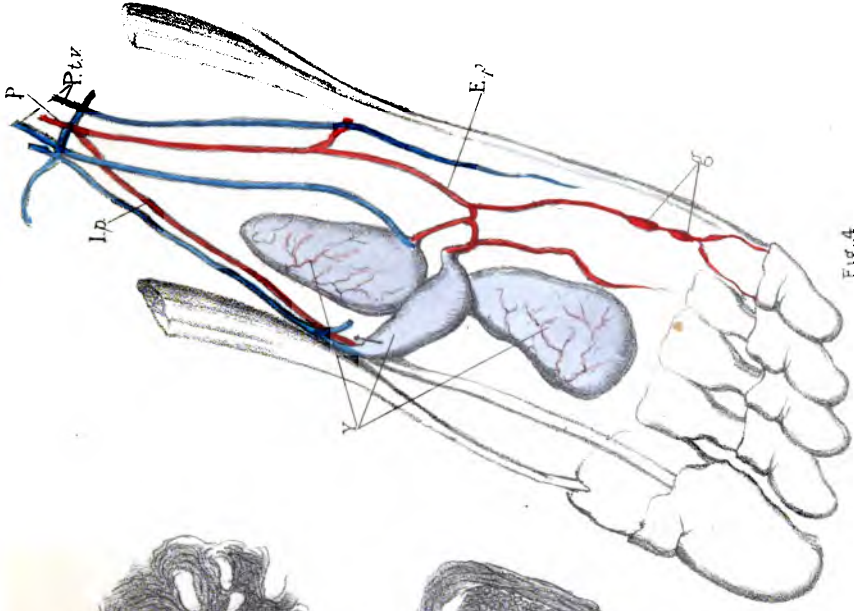


Fig. 4

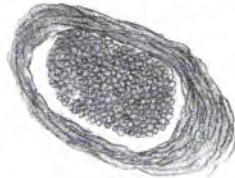
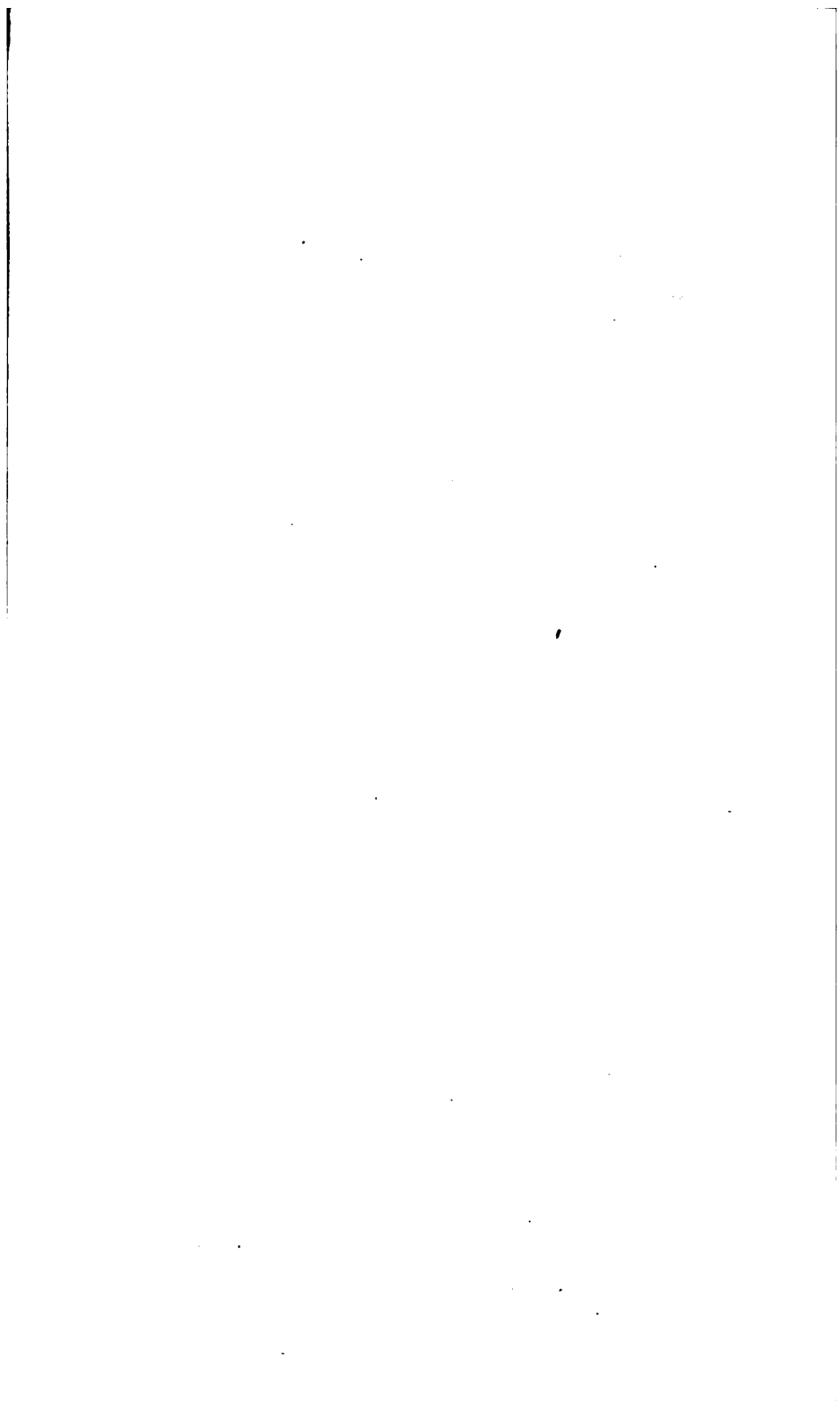
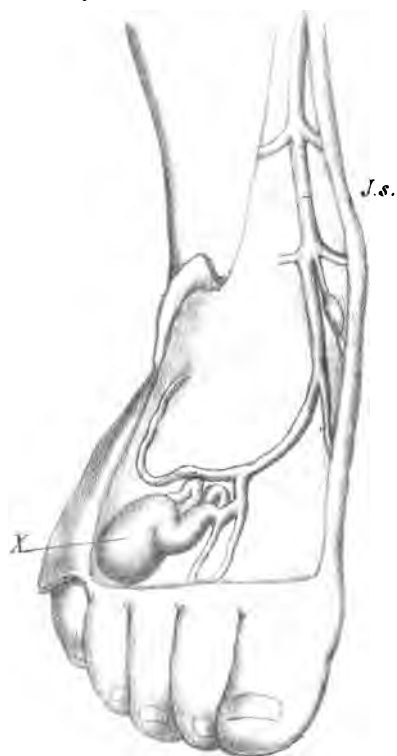


Fig. 3.





ON THE EARLY INDICATIONS
OF
NEPHRITIC IRRITATION.

By G. OWEN REES, M.D., F.R.S.

MANY years ago, when I published my Lettsomian Lectures in the 'Medical Gazette,' I directed attention to the fact that in albuminuria the extractive matters of the blood always accompanied the albumen. It was also shown that under some other conditions the extractives of the blood appeared in the urine without albumen, the presence of the abnormal ingredient being determined by testing with tincture of galls.¹

In connection with this subject, I spoke of effusions into the more delicately constructed serous membranes, comparing the secreting surface of the kidney *in this respect* with the arachnoid of the brain and spinal cord. I showed how by analysis we had determined that the above delicate serous membrane, when diseased, might, according to circumstances, have secreted into it four different kinds of effusion, viz.—1. Water alone. 2. Water, extractives, and salts. 3. Water, extractives, salts, and albumen. 4. Water, extractives, salts, albumen, and fibrin.

Further observation has convinced me that the analogy here pointed out, in respect to the secretion of fluid under

¹ The reaction depends on the precipitating reaction of the tincture upon the animal extractive soluble in alcohol—the impure lactate of soda of Berzelius.

certain pathological states by serous membranes and by the secreting surface of the kidney, is a correct one; and that the tubules of the kidney, when affected by inflammation in different degrees, pour out a fluid which mingles with the urine, and renders it a varying mixture of urine and blood-constituents.

The results at which I arrived in the lectures above quoted, though they showed that when the urine in albuminuria became less albuminous the extractives also became less in quantity, still left it uncertain whether or not they remained in the excretion after the albumen had entirely disappeared.¹ It was also left us to determine whether we might not have extractives present, in cases of Bright's disease, *before* albumen appeared, and thus be able to detect a substance escaping from the blood warning us of the approach of that more serious form of effusion which would render the urine albuminous, and awaken grave suspicions of the nature of the case. Having had my attention directed to this subject during the last few months, I am anxious to record the results obtained, as early as possible. And first I would speak of the urine as we observe it in cases of ordinary albuminuria, when the albumen is about to disappear. Here, after a time, finding no evidence whatever of its presence, we might draw the conclusion that the kidney had returned to its healthy state.

In such cases, however, it very constantly happens that the extractives can be shown escaping in considerable quantity, so that, far from all being well, a constant and important drain is going on from the blood. Acquaintance with this fact serves to warn us against too early a belief in convalescence, for so long as the blood is losing its extractives so long is our patient in peril. The knowledge thus acquired may be turned to much practical use; but the habit of testing urine for extractives as well as for albumen becomes far more valuable in its application to the detection of approaching albuminuria, and it is to this that I would especially invite attention.

It must be remembered that, inasmuch as the precipitate obtained by tincture of galls merely indicates the escape of blood material, we are only entitled to regard it as proving the

¹ 'Med. Gaz.,' vol. xiii, new series, p. 137.

existence of congestion or inflammation of some portion of the urinary surfaces; and we have next to determine, by general symptoms, the position and character of the lesion. I will now shortly describe three typical cases which have occurred to me in relation to this subject.

CASE 1.—Mr. P—, a strong and active man of business, complaining of roughness of skin and a papular eruption about the back and face. He says he has no pain of any kind, but is dyspeptic and experiences sensations of uneasiness which he cannot define. His urine is passed freely; no frequent call to micturate, either by night or by day. Urine *free from albumen* and sugar; specific gravity natural. Tincture of galls indicates the presence of blood extractives.

After a few weeks' treatment the urinary indications were still as above. Six months later, the symptoms remaining unaltered, the urine was again examined, when nitric acid yielded a copious deposit of albumen. The case is going on well at present.

CASE 2.—Master C— suffers much from a pain in the head, which has been considered of neuralgic character. He is pallid, the lower eyelids are puffy, and the face looks œdematous. Urine, sp. gr. 1022; is free from albumen; acid. Tincture of galls indicates the presence of blood extractives. The urine afterwards ceased to yield this last indication under alkaline and tonic treatment.

CASE 3.—Mr. H— states he has always been healthy, except that five years ago he felt dyspeptic and was suspected of passing saccharine urine. He looks worn, and complains of general malaise. Has to rise frequently at night to pass urine, and this frequent call to micturate has existed many months. He is a bad sleeper. In other respects he feels moderately well. Urine, sp. gr. 1029; free from albumen and from sugar; abnormally acid. Tincture of galls indicates the presence of blood extractives in considerable quantity. Urates and oxalate of lime exist as a deposit.

It is, of course, impossible to say what may have been and

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what is the state of kidney in these three patients, but I would claim for the test that in one case it enabled me to suspect the advent of albuminuria, by awakening suspicions which were verified by the result, and which would never have entered my mind had I not had recourse to its use.

In the case of Master C—, whose appearance justified a suspicion of congested or of diseased kidneys, the knowledge of the fact that the extractives of blood were passing away with the urine may have enabled me to be of service when the kidney was in an early stage of engorgement, and before the more serious change had occurred characterised by albuminuria.

In further prosecuting this inquiry I have frequently used the tincture of galls to test the state of urine in cases of calculous disease.

It is well known to those who study the subject that, when uric-acid crystals appear in quantity in the secretion, albumen is occasionally present, and that under treatment it rapidly disappears. In such cases I have had many opportunities of observing that the blood extractives continue to pass away long after the albuminous discharge ceases. Again, I have frequently examined the urine of those who, having passed calculi, become again the subjects of symptoms indicative of the presence of calculus in the kidney, neither pus nor blood, however, showing itself to assist our diagnosis. Here, sometimes, we can detect albumen, and though the determination of its presence cannot be regarded as decisive, still it is strongly corroborative of the view that calculus is present when taken in connection with other symptoms.

It sometimes happens in these cases, however, that, though we cannot find albumen in the urine, we notwithstanding can determine the presence of the extractives of the blood, and thus show that the kidney is really suffering from irritation; and we shall rarely be wrong in suspecting calculus, even though general symptoms abate, if we get a persistent reaction with the tincture of galls. We may, in fact, predict that albumen, blood, or pus, will probably appear sooner or later, and the case declare itself in the usual course.

From observing the reactions of the urine in these known calculous subjects, I was led to apply the test for extractives to those who were the subjects of symptoms indicative of calculus in the

kidney, but who had never passed any concretion, and who could not, therefore, be so well suspected of the disease. In such cases were we to find neither blood, pus, nor albumen present, we might regard the result of our examination as unfavorable to the view that calculus was causing the symptoms. I have, however, in several cases found extractives of blood in such specimens, and, drawing the conclusion that the symptoms were due to calculus, have had my diagnosis confirmed by the result.

It appears to me very probable that extractives will be found preceding the appearance of albumen in the urine in most cases, and that the tincture of galls will, in consequence, become very generally used as a test.

In conclusion, I would ask the assistance of those who may meet with forms of disease which, though distinguished by name, are still pathologically of very uncertain character. I more particularly allude to cases of Addison's disease and Hodgkin's disease,¹ in both of which the urine ought to be carefully examined. In a case of Hodgkin's disease lately admitted into Guy's Hospital, under the care of Dr. Wilks, I had the opportunity of examining the urine, and found it highly charged with blood extractives, though free from albumen. Some days afterwards, however, a slight trace of albumen appeared.

It would be very satisfactory could we show blood extractives escaping in Addison's disease as an explanation of death by exhaustion in that curious malady. I have not as yet made any observations on the subject, but hope to do so at no very distant period.

P.S.—It is necessary to be aware, in applying the test, that the reaction produced by the extractive matters of blood is that which is observed to follow immediately on the addition of tincture of galls. The earthy and potash salts are thrown down from all kinds of urine by the spirit contained in the tincture, after the lapse of five or ten minutes.

¹ Deposit in the spleen, accompanied with enlargement of the lymphatic glands.

NOTES
OF
ABNORMALITIES OBSERVED IN THE
DISSECTING ROOM
DURING THE
WINTER SESSIONS OF 1866-7 AND 1867-8.

BY JAMES BANKART, M.B.,
P. H. PYE-SMITH, M.D., AND J. J. PHILLIPS, M.D.

THE following notes were taken on the spot from the 158 bodies dissected between October, 1866, and April, 1868. As two of us were constantly in the room, it is not likely that any important abnormalities have been overlooked; but we do not pretend to furnish a complete numerical record, nor have we included every minute and commonly observed variation in the extent of muscular attachments, or in the origin of small arterial branches.

In the osseous system, we have had one example of a supracondyloid process of the humerus, and once met with a supernumerary tarsal bone, wedge-shaped, a third of an inch long and deep, and half as wide, placed between the internal cuneiform and second metatarsal bones, with the broad surface on the dorsum of the foot. It had distinct articular cartilage and synovial membrane.

The muscles of the face seem rarely to offer abnormalities, and we have not met with any in this region. In the neck, we have observed the base of the posterior triangle to be much more frequently narrowed by excessive breadth of the trapezius than by that of the sterno-mastoid. In one case the clavicular part of the sterno-mastoid gave off a fleshy slip, which ran upwards and outwards across the subclavian artery to join the platysma. Since then a well-marked muscle has been observed arising tendinous from the clavicle behind the sterno-mastoid, and running as a horizontal muscular band across the base of the posterior triangle, to be inserted tendinous into the clavicular insertion of the trapezius.

The clavicular origin of the sterno-mastoid was, in a few instances, divided into two portions; and in the present session we have had to record a case in which the "cleido-occipitalis" was present.

A very frequent, but not always described, arrangement is for the anterior bellies of the two digastrici to unite in the middle line, so as partly to shut out the tendinous union of the mylo-hyoids from view. The stylo-hyoid has only once been absent, and never under cover of the external carotid. Beside the not infrequent replacement of the stylo-hyoid ligament by a muscular fasciculus, more than one case has occurred of a similar fleshy slip running by the side of that ligament to the lesser cornu of the hyoid bone from the tip of the styloid process, and once from the base of the process on its posterior surface.

In one subject a muscle arose by a thin, pointed tendon from the *upper* tubercle of the chin, and, becoming fleshy, ran backward to blend with the fibres of the hyo- and stylo-glossus, so as to become continuous with the latter (genio-glossus of Wood?).

The extra muscle known as levator glandulæ thyroideæ has occasionally been met with as described in books.¹ In one case we observed the sterno-thyroid of the right side to arise from the front of the cricoid cartilage only; and in another it gave off a muscular slip, which passed up over the hyoid bone to

¹ It is often difficult to say at first whether the so-called levator glandulæ thyroideæ is muscular or glandular. In one case it was certainly glandular, and partook of the same disease with which the thyroid gland was affected.

be inserted into the deep cervical fascia of the submaxillary triangle. The clavicular origin of the omo-hyoid has been occasionally met with, and in one case this muscle arose by a broad tendon extending from the internal angle to the notch of the scapula, and quickly narrowing to form the posterior belly.¹ Its tendinous intersection has been often partly, and sometimes wholly, absent. In one instance, the omo-hyoid having its normal relations, an additional muscle arose from the clavicle near the sternum, and ran up to join the sterno-thyroid before its insertion; in another, a similar slip arose from the first rib. The anterior belly of the omo-hyoid has occasionally been seen to blend with the sterno-hyoid.

Connecting slips between the three parts of the scalenus have been frequently noticed, the most important being a large bundle of fleshy fibres between the subclavian artery and the brachial plexus. In one instance a slender muscular fasciculus descended from the lower edge of the levator scapulæ to blend with the subclavius near its insertion, thus crossing the subclavian artery in the third part of its course.

In the back, abnormal muscles appear to be very rare, and those commonly described are seldom absent, but we have found that their attachments are usually less extensive than they are described. Thus, the trapezius seldom takes origin from more than ten of the dorsal spines, while the levator scapulæ is often attached to only two transverse processes, and the insertions of the splenius colli seldom exceed that number. We have always found the upper fibres of the erector spinæ externus (*cervicalis ascendens*) quite distinct from its internal prolongation (*transversalis colli* and *trachelo-mastoid*), but a long tendinous process very frequently runs up from the longissimus dorsi to blend with the inner fibres of the complexus. In one case a tendinous slip was observed to arise from the first dorsal spinous process, and ran upwards and outwards over the serratus pectus superior and under cover of the rhomboidei, to be inserted with the lowest slip of the splenius into the posterior transverse tubercle of the third cervical vertebra. The only other abnormality noted in this region was a small muscle which passed from the transverse process of the atlas upwards to the mastoid process, between the digastricus and obliquus superior.

¹ The origin of the omo-hyoid is not unfrequently tendinous.

In the body of a negro, which presented several other muscular abnormalities (chiefly additional fasciculi), was found a sternalis muscle¹ *on both sides*. Each was an inch broad, and arose fleshy from the fourth costal cartilage, passing downwards and somewhat outwards over the pectoralis major, to end in a broad aponeurosis continuous with the sheath of the rectus abdominis. It had no tendinous intersections on either side. During the last two years one other instance of this additional muscle has occurred; this was on the left side only of a male dwarf, and resembled that just described. Another muscle, the supracostalis anterior (rectus thoracis), much more rarely met with, was lately observed in our dissecting room. It arose, by a broad flat tendon, from the fourth rib, just outside the corresponding costal cartilage, under the pectoralis minor, and, passing upwards nearly an inch broad, was inserted fleshy into the end of the first rib.²

We have frequently met with the fleshy fasciculi often described, arising most often from the anterior edge of the axilla, and then separating from the pectoralis major, crossing the brachial vessels high up, and inserted into the deep fascia over the biceps, or sometimes into the external intermuscular septum.³ Occasionally they have come off in the same manner from the latissimus dorsi, separated from it in one instance by the intercosto-humeral nerve of the third space, and crossing the upper arm to the same insertion. In a single instance, that of a sailor with very large muscular development, we found a somewhat similar fleshy fasciculus arising from the fifth rib on the right side, and passing outwards and upwards with the pec-

¹ For a full discussion of the varieties and probable nature of this muscle, see Prof. Turner's paper in the 'Journal of Anatomy and Physiology' for May, 1867.

² Having only seen an account of this muscle by Dr. Bochdalek, jun., in Virchow's 'Archiv' (Nov. 18th, 1867), where it is stated to have been hitherto undescribed, I published the case mentioned in the text in the following number of the same journal, but Prof. Turner afterwards informed me that he had described two instances of the same abnormality to the Royal Society of Edinburgh ('Proc.,' Jan. 12th, 1868), and in the May number of the 'Journal of Anatomy and Physiology' for the year 1868 additional cases of it are mentioned. Prof. Turner regards it as representing the pectoral prolongation of the rectus abdominis found in the cat and other mammals.—P. H. P.-S.

³ In a single case the insertion was over the deltoid, and hence the vessels of the arm were not crossed.

toralis minor to be attached to the deep fascia of the arm. A detached muscular slip of the pectoralis major has occasionally been noticed at its lower border; and, in a few instances, the pectoralis minor took origin from the sixth rib.

The coraco-brachialis, as is well known, is often not pierced by the musculo-cutaneous nerve; but sometimes, on the other hand, the separation of its fibres is so great as to make two fasciculi from the coracoid process to the humerus, distinct in their whole extent. Once only have we met with the muscle described as the "coraco-brachialis brevis," or "rotator humeri," arising separately from the coracoid process, and inserted into the upper part of the humerus.¹ In the negro already mentioned, the internal head of the triceps took an additional tendinous origin on the right side from the scapula, close beside that of the long head. In more than one case the biceps had an additional fleshy head arising from a narrow vertical line on the humerus, nearly two inches long, between the attachments of the coraco-brachialis and outer part of the brachialis anticus. It passed down by the inner side of the rest of the muscle, and was inserted into the deep surface of its tendon, the fibres being chiefly connected with the bicipital fascia.

An important variety in this region was a fleshy slip of the brachialis, which, arising from the internal intermuscular septum, crossed obliquely over the brachial artery just before its bifurcation and the median nerve, and then joined the rest of the muscle at its insertion. In two other cases the median nerve was crossed at the bend of the elbow by an additional fasciculus, about two inches long, which united with the pronator teres, after arising in one instance from the bicipital fascia, in the other from the deep fascia somewhat higher up.

All the flexor muscles on the front of the forearm may take origin from the coronoid process. This appears to be constant in the case of the pronator teres and flexor sublimis, and is nearly as often present as absent for the flexor longus pollicis, when, however, it frequently joins the coronoid origin of the flexor sublimis. Several instances have occurred of the same coronoid origin of the flexor profundus (distinct from its ordinary ulnar attachment), the flexor carpi radialis, and the palmaris longus.

¹ See 'Proceedings of the Royal Society,' 1861. Mr. John Wood.

The last-named muscle we once found with its ordinary origin entirely absent, and the coronoid head not, as usual, fleshy, but consisting of a slender tendon, which did not become fleshy till it had emerged from under the other muscles from the inner condyle. A second additional origin to the flexor carpi radialis was noticed in two cases, from the oblique line of the radius, immediately above that of the flexor sublimis, which it closely resembled. On the other hand, we have observed the radial origin of the flexor sublimis to be occasionally wanting. The absence of a palmaris longus has most frequently occurred on the left side, and least frequently on both; in two cases there was a double palmaris, the additional muscle resembling the other in every particular. Occasionally, the palmaris brevis has been absent.

In one subject a fleshy slip was found arising from the deep fascia over the lower end of the radius, and joining the superficial head of the flexor brevis pollicis; in another a similar fasciculus arose from the annular ligament, and joined the tendon of the flexor sublimis to the index finger. In two cases the flexor sublimis gave no tendon to the little finger, but in one this was supplied by an additional tendon from the deep flexor. Twice there was no lumbricalis to this finger.

Besides the more ordinary communications between the extensor tendons on the back of the hand, cases have occurred of an extra musculo-tendinous slip from the extensor secundi internodii pollicis in the forearm to the indicator on the back of the hand; of one taking the opposite direction from the extensor of the index finger to that of the second phalanx of the thumb; and of a similar prolongation from the extensor communis to one of the extensors of the thumb. In two cases the extensor carpi radialis brevior was inserted into the second as well as the third metacarpal bone, and in one the long extensor was double. A fleshy slip which may probably represent the small extensor of the toes was three times observed. Twice it arose as a fleshy bundle from the posterior annular ligament; this was in one case inserted by two long tendons, which joined that of the extensor indicis and that of the extensor communis digitorum to the middle finger; in the other by a shorter tendon, which united with the external abductor of the middle finger. In the third instance the origin was from the dorsal surface

of the third metacarpal bone, and the insertion into the tendinous expansion on the back of the same finger.

We have more than once seen the second lumbricalis arise from both the contiguous flexor tendons.

We have no exact numerical account of the frequency of the occurrence of the *psoas parvus*, but we have noticed it in three cases passing down behind Poupart's ligament and inserted by a broad expansion of its tendon into the line leading from the small trochanter to the *linea aspera*.

Muscular slips so often connect the adductor brevis with the *A. longus* and *A. magnus* (and occasionally with the obturator externus), that the only practically useful rule for separating them in dissection is by the branches of the obturator nerve. In several instances we have noticed similar connections between the pectineus and adductor longus.

In the case of the negro already referred to, the soleus was inserted fleshy into the *os calcis* distinct from the *tendo Achillis*, and in another case it was joined by an extra muscular fasciculus, arising from the subjacent deep fascia in the lower third of the leg, two inches long, and ending in the inner edge of the tendon. A somewhat similar muscle, arising from the same fascia higher up, over the flexor digitorum, became bipenniform, and, without forming any connection with the soleus, ended at the ankle in a well-marked tendon, which was attached to the *os calcis*, to the inner side of the *tendo Achillis*. The third head to the *gastrocnemius*, arising from the femur between the condyles, has only once been noticed by us. The *plantaris* has twice been absent, and once arose from the inner border of the tibia above the oblique line. The flexor longus digitorum and *tibialis posticus* are not seldom inseparably united as far as the beginning of their tendons. In one case an extra fleshy slip arose from the lower part of the back of the tibia, and, passing down as a tendon round the inner ankle, was inserted into that of the flexor longus digitorum just before its junction with the flexor longus pollicis.

The mode of union between these two last-named muscles and the flexor accessorius is well known to vary considerably, and we have met with all the varieties usually described, including the combination in which the tendinous band which often receives the accessory fibres supplies one or more of the tendons to the

toes. The tendon of the flexor brevis digitorum to the little toe we have found much more frequently absent than the corresponding one of the flexor sublimis in the hand.

The gemellus superior has been sometimes wanting, and the degree of union between the tendons of the gluteus minimus, the pyramidalis and the obturator internus, varies very much; but in the muscles of this region, as in those of the shoulders, abnormalities appear to be rare.

In one case only there was no tendon from the short extensor to the great toe, and in another the extensor proprius pollicis divided into two tendons above the annular ligament, which only re-united on the first phalanx. The peroneus tertius has rarely been found entirely wanting, but in a few instances it has been represented only by a very small tendinous slip from the common extensor. In more than one instance the peroneus brevis sent a well-marked tendon forwards from its insertion to join that of the long extensor to the little toe.

A part of the abductor minimi digiti has not unfrequently been found to be attached to the base of the fifth metatarsal bone, representing the muscle described by Mr. Wood as the "abductor ossis metatarsi quinti."

We have not observed the arch of the aorta to be lower than its usual position (1—1½ inch below the sternum), though it is not unfrequently somewhat higher. Injection often distorts its form and relations, but we can quite confirm Mr. Wood's statement that the ordinary account, which describes it as reaching the spine at the third dorsal vertebra, places the end of the arch too high. In a case of transposition of the entire contents of the thorax and abdomen the aorta arched over the root of the right lung, and in this case there was slight lateral curvature of the dorsal vertebræ to the left.¹

Two cases have occurred during the last two years of the innominate artery being suppressed, the right carotid arising directly from the aortic arch, and the right subclavian from the back of its third portion, passing to its normal position, in one case between the spine and the œsophagus, in the other between the œsophagus and trachea. In both instances the vertebral of

¹ The subject, an old woman, was not left-handed. See the account of the case in the 'Pathological Transactions,' vol. xix, p. 447.

the left side arose from the aorta direct—a combination usually observed. In another case both carotids arose from the highest part of the arch by a single thick trunk, less than half an inch long, and passed up for a short distance side by side in front of the trachea before assuming their normal position. In this subject the trachea was remarkably flattened from side to side, where it lay between the two carotids; the right subclavian arose from the third part of the arch and passed behind the trachea and œsophagus, making a third case of suppression of the innominate, but the vertebral on both sides arose as usual. We have twice observed the left carotid to arise from the base of the innominate artery, passing to its usual position in front of the trachea, but behind the innominate vein; and numerous cases have occurred of its origin being moved towards the right so as to lead up to this condition. The left subclavian is also sometimes moved on in the same direction, so as to crowd the three primary branches together at the beginning of the transverse part of the aortic arch. Beside the left vertebral, the only secondary branches we have met with from the aorta were some minute twigs to the thymus and a thyroid artery in a foetus. We have once noticed this *arteria thyroidea ima* to arise from the innominate, and once from the subclavian artery.

The point of division of the carotid artery has seldom been seen to vary beyond the limits usually assigned, never taking place above the hyoid bone, and once only as low as the cricoid cartilage. In one case the superior thyroid arose from the common trunk a quarter of an inch below its bifurcation. The ascending pharyngeal has been frequently observed to take origin from the external carotid much higher up than it is usually described, and sometimes from its occipital or facial branches. One of the commonest variations in this region is the origin of the facial and lingual arteries by a short common trunk, most often on the left side. As a rule, when the facial failed to give off the usual number of branches above the lower jaw, its place has been taken by a large transverse facial; but occasionally the deficient branches have been found supplied from the facial artery of the opposite side. The tonsillar artery, as a separate branch of the facial, we have found quite as frequently absent as present, a large ascending palatine supplying its place; and more than once the facial has supplied the sub-

lingual gland with blood by an enlargement of its normal anastomosis with the sublingual artery through the mylo-hyoid muscle. The posterior auricular was in one case absent, and its place on the cranium filled by a branch piercing the mastoid part of the temporal bone from one of the meningeal arteries. Out of fifty cases specially noticed for the purpose, the internal maxillary artery was found to pass over the external pterygoid in twenty-three, and under it in twenty-seven. We have found the arrangement, as a rule, the same on both sides of the body. In one case the small meningeal branch (arising from the maxillary) passed through a separate foramen in the bone, between the F. ovale and F. spinosum. In another case the lachrymal artery was given off by the middle meningeal, and passed into the orbit through a separate foramen in the greater wing of the sphenoid.

Like other observers, we have found the height to which the subclavian artery rises in the neck,¹ and the number and arrangement of its branches, to present almost continual variations. Abnormalities in its origin have been already mentioned. The vertebral artery of the left side arose in six cases from the arch of the aorta between the carotid and subclavian; in two of these the right subclavian arose as the last branch of the aortic arch, and in another the right vertebral also arose from the aorta. Only one example occurred of the vertebral arising from the common carotid; this was on the right side, and the carotid arose direct from the aorta, the subclavian from the third part of its arch, as noted above. The frequent difference in size between the right and left vertebral artery has been often noticed. In one case it pierced a foramen in the posterior part of the arch of the atlas, and in others the groove in which it usually lies on that bone was excessively deep. We once observed several small branches which entered the inter-vertebral foramina to arise from the first part of the right subclavian.

Out of thirty-one cases noted with reference to the origin of the posterior scapular artery, in seventeen it arose as a separate branch from the third part of the subclavian,² the transversalis colli being either a very small branch of the thyroid axis or

¹ Twice we have noticed it so high as to make the direction of its third part almost vertical.

² In one of these cases the origin was immediately outside the scalenus anticus.

occasionally altogether wanting, and in two of these the supra-scapular also arose separately from the third part of the trunk. Only in eleven were the branches of the axis arranged in what is called by most authorities the normal manner. In two cases the transverse cervical and supra-scapular branches were united until beyond the external edge of the anterior scalenus.¹ In two others the supra-scapular arose separately from the third part. In four cases the ascending cervical artery took origin as a fourth branch of the axis; in three the internal mammary formed a fourth branch of the same; and in four cases the thyroid axis was suppressed, its ordinary branches arising separately from the first part of the subclavian. In one subject the supra-scapular artery, after arising normally, bent down, and passed behind the subclavian vein, so as to twist round it, before running outwards in the usual direction to the scapula. We have more than once observed this artery taking its course through the supra-scapular notch in company with the nerve of the same name. Not unfrequently the supra-scapular artery has been found small and ending chiefly in acromial branches, while its place on the posterior surface of the scapula was supplied by a large dorsalis scapulæ. In one of the cases mentioned above, in which the supra-scapular on the left side arose from the third part of the parent trunk, the internal mammary took its origin from the very end of the same portion, and had to run up some distance on the inner side of the subclavian before entering the thorax;² on the opposite side its course was normal. Lastly, the supra-scapular was in one case observed to arise from the first part of the axillary.

The most common abnormality we have met with in the arteries of the axilla is more or less complete union of the sub-scapular and circumflex branches with a common profunda trunk. The origin of the subscapular and the posterior circumflex alone

¹ In other cases this common trunk did not divide into posterior and supra-scapular arteries until it had passed under the edge of trapezius. When these two branches arise separately from the third part of the subclavian, the posterior scapular generally arises at or near the beginning, and the supra-scapular near the end of that portion.

² In this case the posterior scapular arose as a separate branch from the commencement of the third part of the subclavian, and the supra-scapular from the termination of that artery.

from a single trunk is the most frequent variety, and next a union of the whole or part of the superior profunda. Frequently the dorsalis scapulæ has arisen as a separate branch from the third part of the axillary. In most of these cases the origin of the subscapular has been higher than the lower edge of the muscle of the same name. We have a few times observed the subscapular¹ to arise in common with the long thoracic artery.

This last artery appears most generally to run down the edge of the pectoralis minor to the side of the chest; when absent here, its place is supplied by one of the large pectoral branches of the thoracic axis. A second and less constant long thoracic artery, often additional to this, passes down on the serratus magnus with the nerve of Bell. A third and not uncommon branch, which may be called *A. thoracica superficialis*, arises from the end of the axillary artery and passes down as a very long and slender vessel, immediately under the pectoral fascia, along the anterior margin of the axilla, to reach the side of the chest at the origin of the pectoralis major. This branch is not often described, and from its superficial position and frequent occurrence is of some surgical interest.

The most important abnormality of the brachial artery is its division above the usual point. During the last two years we have thrice observed the bifurcation to take place in the axilla itself, opposite the insertion of the subscapularis; twice the branch which subsequently became ulnar gave off the subscapular and both circumflex arteries; in the third case the two trunks united again a little above the elbow, to divide into ulnar and radial in the normal position, and the median nerve passed through the vascular loop thus formed. In six cases out of fifteen of high division of the brachial, it bifurcated opposite the lower border of the teres major, and in nine at the insertion of the coraco-brachialis. In these cases we have found the superior profunda arise either from the brachial before bifurcation or from the radial branch; the latter has also supplied the biceps and other unnamed external vessels, and the ulnar has given off the inferior profunda and anastomotica. The

¹ More than once a remarkably large branch from this artery has been observed to run quite superficially across the infra-spinatus towards the spine, to anastomose with the posterior branch of one of the upper intercostal arteries.

radial branch has been usually more superficial than the ulnar, and placed at first to its inner side, while the ulnar has represented the brachial trunk in its relations. In no case has either of the two branches been superficial to the deep fascia of the arm.

We have only two examples of a *vas aberrans* to record; both arose from the termination of the axillary artery and ran down the inside of the arm under the deep fascia, to end by anastomosing in one case with the inferior profunda, in the other with the radial artery. In two other subjects a slender tortuous branch arose from the brachial just above the bend of the elbow, and passed down superficially to end in the annular ligament and palmar fascia. A very frequent occurrence is for both profunda arteries to arise in common, or for the main trunk of the superior profunda which accompanies the radio-spiral nerve to arise separately, and the rest to come off with the inferior profunda. We have also very often observed the superior profunda to come off in common with the circumflex, or with that and the subscapular, as above mentioned; in these cases the posterior circumflex sometimes arises from the common trunk below the *teres major*, so as to pass to the back of the arm through a triangular space formed by the *teres major* and the long and external heads of the *triceps*, and then to run up behind the *teres* to the upper aperture through which it usually accompanies the circumflex nerve. In one instance we have noted the superior profunda arising from the third part of the subclavian, and running down with the axillary artery to follow its normal course below the *teres major*; in this case the circumflex and other branches of the axillary were regular. We have rarely seen the inferior profunda or the *anastomotica* entirely absent, but the former often arises in common with the superior profunda, and the anastomototic branch may not only arise as high as two and a half inches above the bifurcation of the brachial, but may be represented by two distinct vessels, one anastomosing with the anterior, the other with the posterior, ulnar recurrent. The radial recurrent has frequently been seen to arise from the brachial, and in two instances this branch has been equal in size to the radial itself.

In the forearm the ulnar, when coming off high above the elbow, has occasionally passed superficially over the muscles

arising from the inner condyle. The radial has always preserved its ordinary position. In four cases there has been a third, or median artery at the division of the brachial, nearly or quite equal to the other two, and in one instance this vessel pierced the median nerve at the wrist, and then formed the superficial palmar arch. In one remarkable case the ulnar ended in the recurrent and interosseous branches, a large median artery supplying its place.

The radial was once observed to pass behind the tendon of the biceps immediately after its origin, its further relations being normal; and twice it passed from the back of the hand to the palm between the second and third metacarpal bones. The superficialis volæ is frequently large, and arises high up, especially when the radial turns early to the back of the forearm, but we have not seen it supply digital branches. The branches of the radial to the thumb and index finger have frequently been found more or less deficient, and the deep arch has occasionally taken the part of the ulnar in supplying some of the digital branches. The communicating arteries between these digital branches and the deep arch are frequently very large.

Among the abdominal arteries we have occasionally noticed the hepatic to arise from the aorta directly, or from the superior mesenteric artery; or the branch to the right lobe of the liver may alone take one of these origins. Where, as so frequently happens, the kidney has been supplied by two or more separate arteries, they have arisen separately from the aorta. In two cases the right spermatic artery arose from the renal of the same side, and in another there were two to each testis, each arising separately from the aorta; while in a third the left spermatic was found passing through a foramen in the corresponding renal vein. In one subject the inferior mesenteric artery arose just *above* the renal.

In the pelvis the most important arterial abnormality is that of the obturator arising from the deep epigastric artery. During the last two years we have observed this in fifteen cases, three times on both sides of the same body. In only four of these cases (three on the left side and one on each side of the same subject) did the obturator pass to the inner side of the femoral ring. In all the other cases but one it took the usual course outside the ring; in this last it passed between the femoral artery and

vein, and then behind the vein and crural ring, keeping close to the bone until it reached the thyroid foramen; it would thus have been equally out of danger in an operation for femoral hernia. In these cases of abnormal origin of the obturator a pubic branch of the epigastric is also present.

We have twice observed an accessory pudic artery,¹ and have twice seen the deep epigastric arise from the profunda in the thigh, and pass up to its usual position behind Poupart's ligament, concealed in one case by the femoral vein. More than once the dorsal artery of the penis has been supplied by the superficial or deeper pudic branch of the femoral.

The extent to which the femoral artery lies uncovered in Scarpa's triangle, like the corresponding position of the carotid in the neck, varies no doubt very considerably; and it can only be determined in each case by careful measurement before the sartorius has been disturbed by cleaning, and while the natural curve of Poupart's ligament has not been destroyed by division of the fascia lata. Practically this is difficult to carry out in a dissecting room, but as far as we have been able to observe this point, the distance between Poupart's ligament and the crossing of the sartorius rarely exceeds three inches. With reference to the origin of the profunda from the common femoral, we have found its distance from the crural arch to be from one to two and a half inches, except in five cases (three on the right, and two on the left side), in which it varied from less than a quarter to three quarters of an inch, and three in which it was as much as three inches, one being on both sides of the same body.

The branches of the deep femoral artery are well known to be as subject to variation as those of the subclavian. We have found the most frequent deviation from the normal arrangement to be the origin of the internal circumflex from the common trunk, and in one case this has been as high as Poupart's ligament; more rarely it arises from the superficial femoral. Next in frequency to the high origin of this branch comes that of the external circumflex, in whole or in part, from the common femoral, sometimes at its very origin; it again arises but seldom from the superficial trunk, though more often than the

¹ In one case the accessory pudic perforated the ligament and divided into two branches, one of which joined the normal pudic just before its division into dorsal artery and artery to the crus, and the other entered the crus. The normal pudic supplied its usual branches in this case.

internal branch. A double internal circumflex is comparatively rare; the upper one from the common femoral then takes its usual course between the psoas and the pectineus, while the lower from the profunda passes between the latter muscle and the adductor longus.

The superficial external pudic has been seen to arise from the profunda. An important branch was observed in one case to arise from the superficial femoral, five inches below the deep circumflex ilii; it passed backwards above the adductor longus, and took the place of the third perforating and terminal branches of the profunda, which itself ended in the two upper perforating arteries.

Not infrequently the popliteal artery divides somewhat higher than usual, and in one of these cases the peroneal branch was given off by the anterior instead of the posterior tibial. The supply of the dorsalis pedis from the anterior peroneal artery was very common; but in one subject the posterior tibial gave off the dorsalis pedis, which passed round the internal malleolus to its usual position, and anastomosed with the anterior tibial.

The important abnormalities in the venous system seem to be confined to variations in arrangement of the great afferent trunks of the thorax and abdomen, of the sinuses of the dura mater, or of the superficial veins of the neck and limbs which do not accompany arteries. Of the first class we have none to report during the last two years. In one subject we observed a remarkably large right occipital sinus taking the place of the corresponding lateral in forming a communication between the torcular Herophili and the jugular fossa, the current of blood having, no doubt, been contrary to its usual direction in this case. It is not difficult in many cases to trace each of the occipital sinuses on to the jugular fossa; indeed some anatomists consider this to be their usual termination.¹

The external jugular vein varies greatly in size, and is occasionally entirely absent, the anterior or posterior jugular branches then taking its place. Not infrequently the temporo-facial vein opens into the external instead of the internal jugular. The venous communications described at the bend of the elbow were imperfect in about half the cases which came under our

¹ Hirschfeld and Leveillé, English translation by Mr. McDougal, 1867.

notice, the median cephalic vein being most often absent. In the lower extremity we have found two large affluents of the long saphenous vein (*v. saph. longa*) to be very generally present, one passing up the front of the thigh and ending just before the saphenous opening (*v. saph. anterior*), the other bringing blood from the parts over the adductors and opening rather lower down (*v. saph. interna vel parva*). The short saphenous vein sometimes passes up into the thigh (with or without a small communicating branch to the popliteal) and empties itself either into the long saphenous by the internal branch just described, or directly into the femoral; and occasionally it has been seen to communicate with the gluteal veins, passing under the *gluteus maximus*.

Abnormalities of nerves, when they consist of an organ being supplied from another than its usual source, are of the greatest physiological interest. But more often they depend only upon the bundles of nerve-fibres which make up a certain branch being bound together for a longer distance, or separated from each other earlier, than usual. Mere variations in relative position to other parts are not so common as among arteries, and, though deserving notice, are generally wanting in the practical interest which many abnormalities in blood-vessels possess.

The frontal nerve often divides, while still in the orbit, into more than two branches, which pass out separately to the forehead. We have noticed one case of the supra-trochlear nerve piercing the frontal bone like the supra-orbital, and one of the nasal leaving the orbit by the posterior ethmoidal foramen. Twice a large branch has come from the second division of the fifth nerve through the spheno-maxillary fissure from the orbit into the pterygoid space. Unfortunately in both cases it had been cut across and the other branches in the neighbourhood destroyed, before it was noticed. It may probably in each case have been the buccal branch of the fifth nerve taking origin from its superior maxillary division, a distribution twice recorded by Professor Turner, and of great interest as an additional argument in favour of the purely sensory function of this branch.¹ The communication on the internal pterygoid muscle

¹ See his paper in the 'Journal of Anat. and Phys.' for November, 1866, p. 83, and a record of the second case in the report on anatomy in the last number of the same journal, p. 198.

which probably always exists between the lingual and inferior dental nerves is frequently very large; more usually it resembles the chorda tympani in size, but differs from it in passing downwards to the inferior dental, not forwards to the lingual. In a remarkable case observed by Dr. Fagge, the anterior belly of the digastric and the mylo-hyoid muscles were supplied on each side of the head by a branch of the glosso-pharyngeal, given off so high up that its origin could be traced only during the dissection of the pharynx; there was no mylo-hyoid branch of the inferior dental nerve.

The descendens noni has been frequently seen to arise apparently from the vagus instead of the hypoglossal nerve, but from the intimate union between the latter two trunks it is probable that the nerve-fibres really came off from their usual source. In one case the right pneumogastric gave off its recurrent laryngeal branch on reaching the lower border of the cricoid cartilage, so that it passed directly into the larynx without turning round the subclavian artery.

The great auricular nerve very often divides into its branches of distribution immediately after appearing from under the sterno-mastoid. The lesser occipital is also frequently double from its commencement, and is sometimes so large as to take the place, to a great extent, of the occipitalis magnus. We have frequently seen it piercing the anterior fibres of the trapezius, and in two subjects it arose from the anterior branch of the third cervical nerve.

The two heads of the nerve of Bell not infrequently remain separate until considerably below the clavicle; in two cases we found this nerve receiving an additional branch from the seventh cervical. The external anterior thoracic branch frequently, or perhaps constantly, sends a branch to accompany the humeral branch of the thoracic axis and the cephalic vein, and in one case we traced this branch into the shoulder-joint. This nerve sometimes helps to supply the pectoralis minor.

In a considerable minority of cases the musculo-cutaneous nerve does not pierce the coraco-brachialis, and then it occasionally joins the median entirely, the combined trunk supplying the usual muscular and cutaneous branches of both. In other instances the musculo-cutaneous only sends off a large communicating branch to the median, the external head of the

latter being then usually small. Lastly, the normal external head may entirely disappear, and then the large branch from the outer cord (or musculo-cutaneous nerve), just described, takes its place completely, and may run as much as two inches down the arm before joining the head from the inner cord.

We have noted eleven cases in which the median nerve passed behind the brachial artery during the last two sessions, exclusive of those in which there was a high division of the vessel, when we have found the ulnar branch, as a rule, to pass in front of the nerve. Once the ulnar nerve was seen to give several branches to help in the supply of the triceps, about two inches above the elbow. In another subject in which the nerve of Wrisberg was absent, and there was only one intercosto-humeral, the internal cutaneous of the musculo-spiral supplied the skin over the inner head of the triceps as low as the elbow; while the ulnar gave a cutaneous branch to the skin over the upper half of the flexor carpi ulnaris, and was itself joined by a branch from the internal cutaneous. In this subject the brachial artery divided opposite the insertion of the coraco-brachialis.

The ilio-hypogastric and ilio-inguinal¹ nerves are more often united as far as the outer edge of the quadratus lumborum than separate, and the old description of the anterior division of the first lumbar nerves giving off three branches, iliac, hypogastric, and inguinal, has not been improved on by that now generally given. On the other hand, the crural and genital branches of the second lumbar nerves not infrequently pierce the psoas separately and do not again unite. The external cutaneous nerve of the thigh often runs over the iliacus in two or more divisions, the lower ones passing under Poupart's ligament internal to the notch below the anterior superior spine of the ilium. These internal branches are usually placed superficial to the sartorius, but not infrequently there are two sets, one passing under and one over the sartorius. Occasionally the external cutaneous seems to arise from the third and fourth lumbar nerves directly or by means of the anterior crural, and once it came off from the latter after it had passed into the thigh. It is not uncommon to find one branch of the middle cutaneous arising from the anterior crural above Poupart's ligament.

¹ It would be much better if this nerve were called simply inguinal. It has no iliac branch, and the double name only serves to create confusion.

Not infrequently the superficial perineal nerves are increased to three, and in more than one case the inferior pudendal was found piercing the great sciatic ligament to reach the ischio-rectal fossa. We have already mentioned the frequency of the great sciatic nerve dividing and being divided by the pyramiformis. As a rule the branches thus formed do not form the two popliteal, but reunite below the ischium. In a few subjects we noticed the short saphenous nerve to supply the whole of the fifth and half the fourth toe, and in one case two toes and a half.

The most important visceral abnormality which has occurred during the last two winters was complete transposition of all the thoracic and abdominal viscera, together with the great vessels ('*Path. Trans.*,' xix, p. 447). In this, as in most other recorded cases, the transposed viscera were normal in every other respect. The body was that of an old woman from the Mile End workhouse.

This remarkable arrangement has been observed very frequently since Riolan described the first case, that of an executed criminal, in the year 1668. It appears to be more common than transposition of the thoracic or abdominal viscera, or of the aorta and its branches, alone: it has been recognised during life, and is proved by the case here recorded, and by several others, to have nothing to do with the peculiarity of left-handedness. It seems difficult to form any theory to explain its occurrence. Von Baer found in one case (that of a foetal duck) a change in the position of the umbilical vesicle, which he thought might throw some light on the abnormality. Virchow has suggested a reversed twisting of the umbilical cord. If we knew what causes govern the reversed bilateral arrangement not infrequently observed in univalve mollusks, it would probably throw light upon similar transpositions in the higher animals.

THE HUMAN EYE IN HEALTH AND DISEASE

AS SEEN WITH THE OPHTHALMOSCOPE.

THIRD SERIES.—PLATES ILLUSTRATING MORBID CHANGES
IN THE OPTIC NERVE (OPTIC DISC).

By C. B A D E R.

OBSERVATIONS on the living and dead show that certain forms of cerebral disease are accompanied by visible anomalies of the optic nerve, where it passes through the tunics of the eyeball. Among these anomalies the most conspicuous are disturbances in the blood-vessels of the retina and changes in the connective tissue of the optic nerve. To recognise the various stages of such disturbances a knowledge is required of the appearances of the healthy optic disc. (See Plates second series.) Slight anomalies in the blood-supply to the optic disc and retina are readily overlooked; they display themselves more particularly in the veins in the optic disc. Higher degrees, as represented in the figures, are easily recognised, even by the less experienced ophthalmoscopist.

Tumour of the brain, especially of the fibroplastic kind, is, as post-mortem examination proves, the disease which is usually found with the changes of the optic nerve (optic disc)

represented in figs. 2 to 6. If the changes have assumed the appearance represented in figs. 4 and 5 they are termed inflammation of the optic nerve (optic disc); *Neuritis optica*.

Observation of many cases has shown that anomalies of the optic disc, especially in the stage represented in figs. 2 and 3, may be present for months without the patient's sight appearing impaired or his general health being disturbed; just as cerebral tumour in certain parts of the brain, if increasing slowly, may attain a very large size before *coarse* symptoms of cerebral disease show themselves. This and the fact that a speedily fatal termination has been observed in several cases which had presented the changes shown in the figs. 2 to 6, show the importance of an ophthalmoscopic examination. The discovery of these ocular changes by means of the ophthalmoscope, long before other disturbances appeared in the patient's health, has also aided in the recognition of some of the finer symptoms of cerebral disease.

Among numerous such cases observed at the hospital there is one (now under observation) in which the optic disc of only one eye (left) is affected; at the first examination it resembled the one shown in fig. 6. In all other cases both optic discs appeared to have been affected simultaneously or in rapid succession. Other general (syphilis) and ocular (glaucoma) morbid changes likewise present the peculiarity of appearing simultaneously or in quick succession in the two optic discs.

EXPLANATION OF THE PLATES.

All the figures of this series represent the optic disc (for the meaning of this term see the 'Guy's Hospital Reports' for 1867, page 510 to 526, and Plates), its blood-vessels and those of the retina, and the retina, choroid, and sclerotic immediately adjoining the optic disc.

The optic disc occupies the middle portion of each figure. The centre of the disc is readily recognised by the vessels which diverge from it. The larger dark-red vessels are the veins of the retina. The arteries of the retina are few and

thin, and have a light red colour. Both kinds of vessels meet near each other in or near the middle of the optic disc.

The red surface which surrounds the optic disc, and extends up to the black margin of each figure (except fig. 3), and upon which the retinal vessels ramify, represents the choroid. The retina being transparent, its place is indicated by its blood-vessels only.

The parts shown in the figures are represented much enlarged. (As regards the real and apparent size of the optic disc in health see the 'Guy's Hospital Reports' for 1867, p. 513.)

FIG. 1.

The optic disc, the retinal blood-vessels, and the retina, choroid, and sclerotic adjoining the optic disc, of an eye which was protruding considerably. (Right eye. Age of patient 27.)

The protrusion of the eyeball occurred rapidly, owing to the formation of a new growth in the orbit. The fellow eye appeared healthy.

In great protrusion of the eyeball, especially if appearing rapidly, changes in the optic disc and adjoining tunics are sometimes observed, which in some respects resemble those seen during certain stages of inflammation of the optic disc. To allow of comparison, therefore, fig. 1 has been added to the present series.

The large unequally dilated and tortuous blood-vessels, which converge towards the middle of the figure, are the veins of the retina. Only one small retinal artery is seen going upwards from the centre of the figure.

The middle of the figure is occupied by a whitish spot (the white fibrous tissue which surrounds the blood-vessels of the retina in the optic disc); round this we observe a light yellowish-pink, then a grey, and joining the black border of the figure a light red surface. The whole has a striated appearance, the striæ radiating from the centre of the figure.

From "direct" examination with the ophthalmoscope and from the apparent course of the retinal veins it was inferred that the growth behind the eyeball had been displacing the optic disc and the adjoining tunics, thus interfering with the passage of blood across the optic disc into and out of the

retina. The grey ring which surrounds the light yellowish-pink surface is supposed to represent the part where the protruding portion of the tunics joins that of normal curvature.

Fig. 1 most resembles fig. 4 as regards the condition of the arteries and veins of the retina. This condition, in the one case (fig. 1), was observed in the protruding eye only; in the other case (fig. 4) there was no protrusion of the eyeball, and the condition of the blood-vessels was the same in both eyes.

In inflammation of the optic disc the contour of the disc can be recognised at all stages of the inflammation; in simple protrusion from pressure behind the eyeball the contour of the disc is effaced, as shown in fig. 1. In inflammation of the optic disc the entire optic disc is altered in colour, including even the fibrous tissue which surrounds the retinal blood-vessels in the disc; in simple protrusion this tissue remains white.

Extreme protrusion of the eyeball may exist without any anomalies being perceived with the ophthalmoscope; while even in the earliest stages of inflammation of the optic disc an over-fulness of the retinal veins is observed.

Fig. 1 is a faithful copy of the original drawing.

FIG. 2.

The optic disc, and the retina, choroid and sclerotic immediately adjoining it. (Left eye. Age of patient, 34.)

Stage of hyperæmia preceding swelling (inflammation) of the optic disc.

The optic disc is represented in the middle of the figure; it has a uniform pale red colour, which shades off into the deeper red colour of the surrounding choroid. Two large arteries (of a light red colour) pass from the middle of the optic disc; the one upwards, the other downwards. Two large veins (of a dark red colour) and numerous small tortuous veins come from the retina, run across the optic disc and converge close to the arteries.

In the red choroid to the right of the optic disc we perceive a few darkish spots; these represent groups of the stellate pigment-cells of the choroid.

Fig. 2 is a faithful copy of the original, except as regards the shading off of the light red colour of the optic disc, which

in the original is represented as being less abrupt. In this respect fig. 3 is more accurate.

FIG. 3

represents the same parts as are shown in fig. 2.

The optic disc, the blood-vessels, and the extent of the adjoining retina, choroid and sclerotic which were seen simultaneously with the optic disc, are, as regards size, represented as they appeared when viewed with the ophthalmoscope in the inverted image. (See Guy's Hospital Reports for 1867, page 510, &c.)

This figure is a faithful copy of the original.

FIG. 4.

- The optic disc and the retina, choroid and sclerotic immediately adjoining it. (Right eye. Age of patient, 37.) *Stage of inflammation.*

The optic disc, represented in the middle of the figure, has a light red tint which merges into the uniform darker red colour of the adjoining choroid. (On "direct" ophthalmoscopic examination the surface of the optic disc was found to be abnormally convex [swollen].)

The blood-vessels (veins of the retina), which converge towards and meet in the optic disc, present several anomalies. In the retina, over the red surface (the choroid), they appear much enlarged, and slightly tortuous. Where they pass across the margin of the optic disc, they appear thin and indistinct; on the optic disc they seem larger, but still indistinct, and bulged forwards, forming arches, the convexity of which is directed towards the vitreous chamber. The thinness and indistinctness of the retinal blood-vessels, where they pass across the margin of the optic disc, has been shown by dissection to be caused, partly by their disappearing in the swollen, semi-opaque margin of the optic disc, partly by their being bent at this spot; they leave the surface of the retina and suddenly climb up along the steep sides of the optic disc. (This peculiarity of the veins of the retina over the margin of the optic disc is observed in inflammation of the optic disc as

long as the margin of the disc continues swollen.) No arteries of the retina are perceptible.

The choroid is represented as a uniform and unusually red surface. The retina, judging from the distinctness with which the choroid is seen, appears nearly transparent.

As regards the merits of Fig. 4 as a copy of the original, it must be stated that the sides of the bulging optic disc ought to have been represented of a more grey red tint; and that some of the retinal veins, where they pass over the margin of the optic disc, ought to appear somewhat more indistinct.

FIG. 5.

The parts represented in fig. 4, as they appeared after prolonged examination with the ophthalmoscope.

The centre of the optic disc retains nearly the colour it has in fig. 4, but its margin appears much altered in colour as well as in shape; it has a bluish-grey colour.

All the smaller veins have disappeared, the large ones only are seen distinctly in some parts of the retina. Two large ones are dimly seen in the optic disc. The optic disc appears smaller and altered in outline. On direct ophthalmoscopic examination its undue prominence (swelling) was found to have become little altered.

A change during ophthalmoscopic examination in the calibre and distinctness of the blood-vessels and in the colour of the optic disc (and of the adjoining tunics, if inflamed) has been observed, not only in cases of inflammation of the optic disc, but also when such inflammation has been complicated with choroido-retinitis near it. This change is most striking if the optic disc alone is inflamed; the change is the greater the more prolonged the examination with the ophthalmoscope. The alteration in colour and shape seems to be connected with undue contraction of the blood-vessels of the retina and optic disc.

FIG. 6.

The optic disc and the retina, choroid, and sclerotic immediately adjoining it. (Right eye. Age of patient, 29.) *Stage of atrophy* subsequent to inflammation.

The optic disc occupies the middle of the figure. The centre has a white, the rest a light bluish-grey colour ; the two colours merge into each other. The optic disc appears somewhat ill-defined and oval-shaped ; the numerous darkish spots to its left are situated in the red choroid, and represent groups of stellate pigment-cells.

Two very thin retinal arteries and two large retinal veins are seen meeting in the white part of the optic disc. Direct ophthalmoscopic examination still shows the disc surface to be abnormally convex ; and this is confirmed by the course of the vessels in the optic disc.

Fig. 6 is a good copy of the original, except that the margin of the optic disc ought to have been represented as shading off more softly into the adjoining tunics.

1.

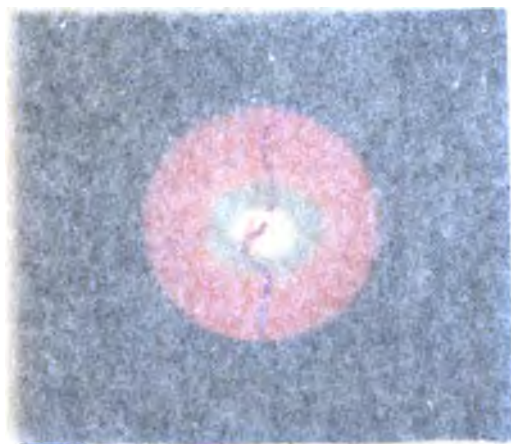
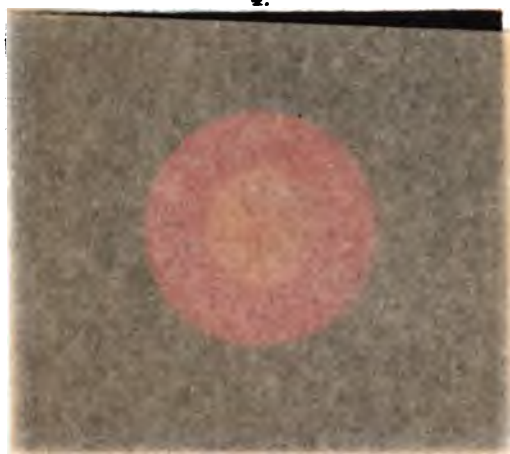


2.



3.





ON THE STRUCTURE
OF
TWO FORMS OF TOOTH TUMOUR.

S. J. A. SALTER, M.B., F.R.S.

IN December, 1867, M. P. Broca read a paper before the Academy of Sciences of Paris, under the title "*Recherches sur un nouveau groupe de Tumeurs désigné sous le nom d'Odontomes*," in which he described some of the hard excrescences which hypertrophy and abnormal growth of the tooth-tissues produce. None of the abnormalities described by M. Broca were new, though the arrangement of them under the one head—tooth-tumours—had not been before adopted by authors. Moreover, M. Broca's list was very incomplete, as no reference to either of the forms of tooth-tumour I am about to describe appears in his paper. Still, I think it must be conceded that to arrange all the tumours formed by the increased and perverted growth of the tissues of the teeth, under one head, is rational and expedient, and that the term "*Odontome*" is a convenient and legitimate expression.

The two *Odontomes* I am about to describe differ very materially in practical importance, while they are both of considerable physiological interest. Both are congenital. The one is extremely rare, but from its size is likely, when it occurs, to entail the necessity of serious surgical interference: the other is so minute and apparently so trivial, that the term 'tumour' might perhaps seem scarcely applicable to it; still, the expression may be fairly used; and the list of tooth-tumours

would be incomplete without a description of this the smallest example.

I. A TOOTH-TUMOUR CONSISTING OF AN HYPERTROPHIED,
ABERRANT FANG.

I believe that this heading best expresses the nature of the growth I am about to describe.

It is a specimen of disease of very great interest: it is extremely rare, and the only instances, which I believe to be similar, have been misunderstood.

The tooth with the tumour attached to it constitutes preparation 1022 of the Museum of the Royal College of Surgeons of England, and is believed to have been in the collection of John Hunter.

The Museum Committee of the College have very kindly allowed me to conduct these investigations.

As regards the rarity of this monstrous growth there are, I believe, three examples in known existence—neither more nor less—and all have, I venture to think, been misinterpreted. I feel that I ought to make this statement with great deference, considering the authorities who have described the specimens in question: at the same time I have no doubt about it in my own mind. The examples to which I have alluded are—

1st. One described by M. Forget.¹ It consisted of a large tumour, about the size of a bantam's egg, attached to the posterior surface of a lower molar tooth, adherent to the neck and a considerable portion of the fang. This specimen was taken from the mouth of a Frenchman, 40 years of age, who came to Paris to have the tumour removed on account of the annoyance it occasioned. The tumour occupied the left side of the lower jaw, expanding its sides, especially the outer, and disfiguring the face.

M. Maisonneuve, who attended the patient, determined to extract the tooth as a preliminary step to removing the tumour: the tooth, however, and the tumour came away together.

¹ 'Des Anomalies Dentaires, et de leur influence sur la Production des Maladies des Os Maxillaires,' par M. Forget, Paris, 1859. Obs. III, p. 27, pl. ii, figs. 1 and 2.

A section of the specimen through its entire length shows a complete continuity of tissue between the two, and the part in the illustration where the tumour and tooth are united is singularly like that seen in the specimen in the Museum of the College of Surgeons. The tumour is said by Forget to be composed wholly of osseous tissue.

2nd. The second example is recorded by Mr. Tomes in a paper read by him before the Odontological Society of Great Britain, April 6th, 1863.¹ The specimen was presented to the Odontological Society by Mr. Hare of Limerick. "The tooth, a molar, was taken from the upper jaw of a countryman, 41 years old, who for some years previously had suffered severe pain in the jaw. The cheek was perforated by a canal through which matter constantly poured. After the removal of the tooth the pain in the jaw ceased, and the wound in the cheek healed." Connected with the fangs of the tooth is a large, lobulated mass, four or five times as big as the tooth itself. "The number and relations of the roots of the tooth are obscured by the mass of cementum by which they are surrounded. The mass itself may be roughly described as built up of three coalescing flattened lobes, not very distinctly marked: one immediately investing the roots of the tooth, and composed of dense cementum; a second, continuous with the first, marked by abrasions produced by superficial absorption of the tissue, and presenting an appearance of less density than the preceding lobe. The third and terminal division is double the size of either of the preceding portions of the tumour." Though Mr. Tomes speaks of this tumour as an exostosis—as being composed wholly of *crusta petrosa*—no examination of its tissues appears to have been made with the microscope. The opinion is merely an inference.

3rd. The third specimen, which I now describe, is that existing in the Museum of the College of Surgeons. The only published reference to it with which I am acquainted occurs in Mr. Heath's admirable work on 'Diseases and Injuries of the Jaws.'² Mr. Heath, perceiving the similarity

¹ Description of a "Remarkable case of Exostosis," by J. Tomes, Esq., F.R.S., in 'Transactions of the Odontological Society of Great Britain,' vol. iii, p. 335. London, 1863.

² 'Injuries and Diseases of the Jaw,' the Jacksonian Prize Essay of the Royal
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and the apparent identity of this tumour with those figured and described by Forget and Tomes, includes it in the same category, and describes it as a large exostosis. "In the Museum of the College of Surgeons is a specimen of large exostosis, due to hypertrophy of cementum."

This preparation consists of a rather small molar tooth from the posterior fang and neck of which passes off a large lobulated tumour, flattened from without inwards, more than twice the size of the tooth itself. The continuity of the tissues of the two is complete: the tumour is adherent to the tooth for its entire thickness from side to side. The form of this adventitious growth and its relation to the tooth will be better understood by the accompanying figure than by any lengthened description. The surface of the large distal lobe is very white and polished: the structural continuity of the tumour and the tooth at their junction is very conspicuous.

FIG. 1.



Molar tooth with hypertrophied aberrant fang.

Desirous of ascertaining the histological character of this tumour, I made a lengthwise section of it as nearly in its axis as possible. It was not strictly axial, as that would have involved the tooth, injury to which I was anxious to avoid: still the section was sufficiently near the centre to disclose the nature of the growth and its relation to the tooth to which it was attached.

In grinding down the specimen, a small portion of the thin layer broke away from the narrow extremity: this does not, however, interfere with the demonstration of its structure, as I had already proved by repeated examinations with low magnify-

College of Surgeons of England, 1867, by Christopher Heath, Esq., F.R.C.S. London, 1868.

ing powers, what were the histological elements constituting the section before it was sufficiently thin for permanent mounting.

The two illustrations — one a woodcut (Fig. 2) and the other an accurate lithographic plate (Pl. I)—show with perfect fidelity what is the structure of this tumour. The former is especially intended to display the relation of the parts of the growth to the tooth to which it is attached; and, though somewhat diagrammatic, is nevertheless strictly true.

A section of the tumour in the direction indicated in this figure (Fig. 2) shows the outer layer to be composed of a

FIG. 2.

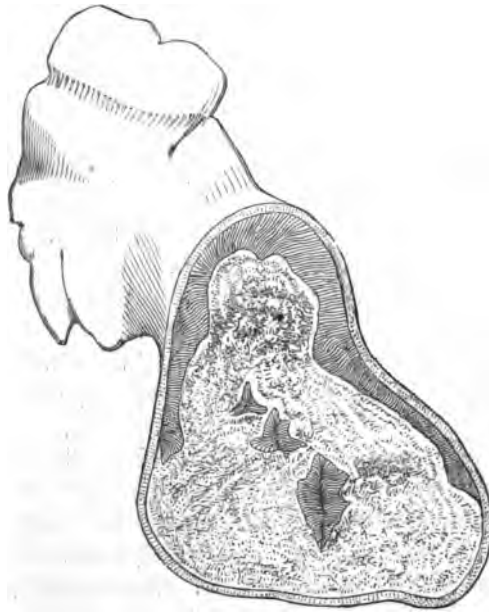


Diagram of tooth and fang-tumour, showing the method of section and the general arrangement of the constituent tissues.

coat of *crusta petrosa* or *cementum*: it is even, compact, and of the usual character seen on tooth-fangs. Within this is a layer of true *dentine*: this does not constitute the entire circle of the section, but for about two thirds of its circumference separates the external cemental layer from the *nucleus* of the growth, as it may well be styled. It is the two

thirds towards the attachment of the tumour to the tooth. For the remaining third there is no limitary band of dentine separating the nucleus from the crusta petrosa; but the line of demarcation between the two is perfectly distinct. This is seen conspicuously both in the diagram (fig. 2) and in the scrupulously accurate figure in Plate I. In the latter, as I before remarked, a slight deficiency of tissues will be observed towards the narrow extremity, where the parts broke away in the process of grinding.

Upon examining the tissues of this section with high microscopic powers, the nature, the meaning, and the relation of these several histological elements are quite clear, as is their source of developmental production.

The outer layer is one of ordinary crusta petrosa, such as is seen on healthy tooth-fangs: it is laminated, non-vascular, and with the usual scattering of lacunæ, parallel to the axis of the laminæ.

The layer of the dentine is equally conspicuous and unmistakable; and, as is usual, the tubes have a general direction at right angles to the pulp-cavity and to the external surface of the growth of which they form part.

The nucleus of this odontome, its structure as displayed by high magnifying powers, and the inference as to its nature and source, constitute the most important points of interest in the specimen: they involve its meaning—the question what it really is.

1st. The *structure* of the nucleus. It is highly vascular, and the arrangement of the vessels is like that of the tooth-pulp; they branch and unite, and diverge in every conceivable direction; and their average diameter is about that which is seen in an uncalcified dentinal pulp. As regards the minute elements of structure, lacunæ largely prevail, and frequently occupy the whole field of the microscope: they are, however, somewhat peculiar, being large, without axial definition, and surrounded by crowds of canaliculi, looking like patches of moss. From this extreme form there is every conceivable variety of shape, passing by degrees to distinct and unmistakable dentinal tubes. Again, in other parts of the nucleus, isolated patches of true dentine are to be found, and some of these remote from the dentinal band and close to the

crusta petrosa which bounds the bulbous end of the tumour. Moreover, in many parts there are masses of those calcification globules characteristic of dentine. In fact, the nucleus is composed of a confused mass of bone-structure and dentine-structure, arranged around and separating an elaborate vascular network of the same character as that of a dentinal pulp.

2nd. As to what may be inferred regarding the nature and source of this structure. It must be observed that the nucleus is *embraced within* a belt of true and unmistakable dentine:—that for two thirds of its limit it is thus separated from true tooth-bone: that it is essentially different from the crusta petrosa hard by. It must be remembered further that whereas bone lacunæ may be found in a calcified dentinal pulp, dentine is never found in an exostosis—is never produced by the periodontal membrane.

In a paper which I published in the 'Guy's Hospital Reports' (1855), "On the intrinsic calcification of the tooth pulp," I showed that the dentine pulp, when it had undergone calcific impregnation of its whole structure, would often yield a mixture of bone tissue and dentine; and I figured one specimen, that of a temporary molar long retained in the mouth, and whose pulp had become calcified, in which the axis of the tooth did present this mixture of dentine and bone. Now, it would be impossible to distinguish the calcified pulp of this tooth from portions of the nucleus of the tumour I am now describing if they were placed under microscopes side by side.

I have no hesitation in saying that this nucleus was produced by the intrinsic calcification of a large dentinal pulp, of the same size and form as the nucleus; that the belt of dentine was the primary and normal development of that pulp; and that this hypertrophied and abnormal pulp, ceasing to contract and prolong centripetally the dentinal tubes, underwent a confused bone and ivory genesis, retaining its then vascular condition. It is scarcely necessary to refute the idea of this being an exostosis. Dental exostosis is entirely external, superficial to the ivory of the tooth: it is an extraneous growth deposited outside the dentinal system and in no way affecting it. A section of a tooth-fang, however incrustated with exostosis, has its dentinal element unaltered.

Exostosis is a secondary affection occurring in after life. This expanded cone of dentine necessarily involved an original development of the same form—as dentine grows from without inwards; while *crusta petrosa* forms from within outwards.

I have expressed my belief that both the specimens described by Forget and Tomes are of the same nature as this specimen, and that they are not exostoses, as stated; and I have come to this conclusion for many reasons. Their similarity,—there is a close resemblance between the specimen I have described and the other two instances; it is especially like M. Forget's. In the latter case, too, the growth sprouts from the neck of the tooth principally, where exostoses do not occur. Again, there is nothing to lead up to the idea that these are exostoses; there are no intermediate forms, nothing between the incrustations and small nodular tumours, which really are exostoses, and these large calcified masses. If these were exostoses, as stated, we should expect to find smaller ones of the same nature and more frequently: but that is not so.

M. Forget states that the structure of his specimen was proved by the microscope to be exclusively osseous tissue. I cannot, however, help feeling a doubt whether the whole area of the cut specimen was scrutinised with exhaustive care. The accidental failure to examine a small space just within the outer coat of the tumour would lead to a total misapprehension of its nature. In the specimen I examined I obtained sections from the nucleus which were osseous nearly altogether, or with such faint indications of the dentinal element as easily to elude the observation of a microscopist, not anticipating their presence. As regards Mr. Tomes's specimen his statement that it is an exostosis amounts to nothing, as he did not examine its tissues with the microscope. I very much wish that both Forget's specimen and the one described by Mr. Tomes could be very carefully examined histologically and in all their parts.

There is one point in reference to Forget's and Tomes's specimens of interest and of anatomical value: they both display hollows or cavities, and, in the latter, the bulbous extremity of the tumour was little more than a hollow calcified cyst. This is never seen in true exostosis; but it is quite consistent with the idea of an hypertrophied, expanded, tooth-

fang, whose pulp had not undergone calcification ; it would be the equivalent of the specimen I have described, in which the tooth had been removed before the nucleus had passed from a soft pulp to a calcified mass.

II. ENAMEL NODULE, OR SUBMERGED CUSP ON TOOTH-FANG.

This little Odontome is by no means uncommon. I have several examples of it in my collection. It occurs on teeth which are otherwise healthy and generally well formed, and I believe its presence is never indicated by any symptoms while the tooth remains implanted in the jaw. I have usually seen it on molars and not far from the neck of the tooth : it generally occupies the groove at the side between two fangs, and very frequently there is a conical process of enamel passing down from the crown of the tooth towards the nodule, the two resembling in form a note of exclamation, thus—!. At other times the nodule is quite alone and free, and may be at any distance from the crown of the tooth. I once saw an enamel nodule at the very apex of the fang of a pre-molar. The nodule is like a little white pearl stuck to the side of the tooth-fang. When the tooth is fresh extracted the enamel pulp is stretched over it and can be opened and folded back, just as can be done to the crown of a young tooth before it pierces the gum. It seems that, in the formation of this tumour, a little pocket of the enamel sac of the crown had to be shut off, as it were, from the main sac of the crown. The accompanying illustration is taken from an upper wisdom tooth of rather unusual size and form. The nodule,

FIG. 3.



Superior dens sapientiæ, with enamel nodule on fang.

in this case, was quite independent of the enamel of the crown. After this drawing was executed I made a transverse section

of the tooth across the centre of the enamel nodule, and the illustrations forming Plate II are taken from this specimen. The structure of these nodules is not so simple as appears from mere external examination. They look, indeed, as if they consisted only of a grain of enamel adherent to the fang, just as is the case with a nodule of exostosis—a simple external addition without, and not affecting the dentinal system of the tooth. Such, however, is not the case. The nodule is in reality a minute tooth-cusp, consisting of a cone of dentine clothed upon by a thick tubercle of enamel: the structure is in every respect the same as that of an ordinary cusp on the crown of a tooth; the form rather rounder, perhaps, but essentially the same histologically.

It is not worth while to prolong a description of the structure of this little Odontome, whose anatomy is sufficiently indicated in the illustrations of Plate II. I may mention, however, that the enamel is particularly white, the fibres being very zigzag with interspaces between them. Viewed with transmitted light this produces considerable opacity and apparent brown colour.

NOTE.—After the foregoing paper was written, and when the illustrations were already in the hands of the engraver, I first saw Heider and Wedl's very recently published *Atlas to the Pathology of the Teeth*.¹ Both the tooth tumours I have now described are figured by these authors, and there is also a brief explanation of the illustrations. I have, therefore, no claim to priority of publication. My own observations were, however, perfectly original and independent. Though the descriptions of the figures given by Heider and Wedl are short and imperfect, and though the microscopic drawings are neither sharp nor very definite, still the anatomical and pathological identity of their specimens with mine is unmistakeable. The larger tumour, that of the hypertrophied expanded fang, is very interesting: it is singularly like the specimen from the College of Surgeons, though the growth is rather smaller. The microscopical section displays the same arrangement of structures as I have described—an outer layer of crusta petrosa, then a thin

¹ 'Atlas zur Pathologie der Zähne, bearbeitet von weil. Prof. Dr. M. Heider und Prof. Dr. C. Wedl,' Leipzig, November, 1868.

sheet of dentine enclosing a large nucleus of calcified tissue, abundantly vascular, with numerous lacunæ and inter-globular spaces. No mention is made of any patches of dentine being found in the nucleus.

This specimen is of especial importance, as the thin layer of dentine is absolutely continuous and everywhere separates the outer layer of crusta petrosa completely from the nucleus; so it is obvious, though the latter contains an abundance of lacunæ, that its formation was not effected by the periodontal membrane, but by the conversion (intrinsic calcification) of a monstrous dentinal pulp. This I have already enforced as regards the specimen I have described, but in Heider and Wedl's example the fact is shown, if possible, even more conclusively.

The smaller tumour—the enamel nodule on the fang—figured by Heider and Wedl is imperfectly illustrated: it does not show in section its relation to the fang.

DESCRIPTION OF PLATES.

PLATE I.

Microscopic section of fang-tumour, showing the circumferential layer of crusta petrosa, the Λ -shaped layer of dentine and the nucleus of osteo-dentine in which are displayed three distinct patches of true dentine.

The specimen is slightly defective at its upper edge; the tissues (crusta petrosa and dentine) were, however, quite continuous, but were injured in preparing the specimen.

PLATE II.

Fig. 1. Transverse section of faugs of molar tooth, through enamel nodule.

Fig. 2. Enamel nodule more highly magnified.



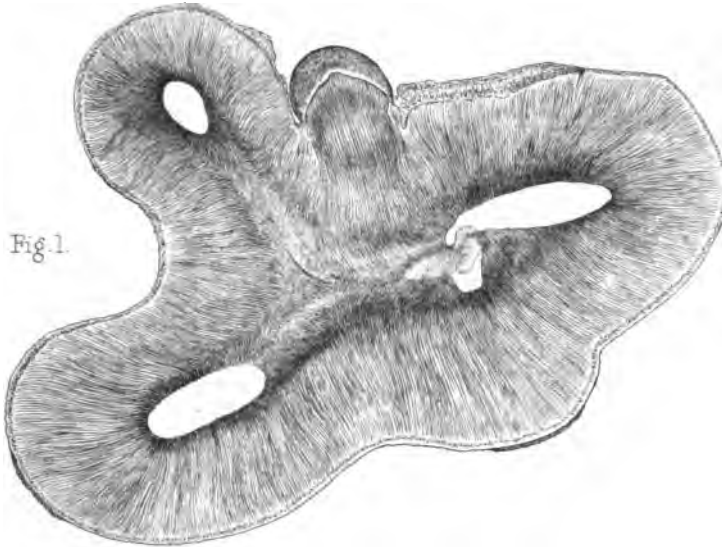


Fig 2.



CONTRIBUTIONS
TO THE
PRACTICAL SURGERY
OF
NEW GROWTHS OR TUMOURS.

SERIES VI.
CARTILAGINOUS AND BONY GROWTHS.
(CONTINUED.)

By JOHN BIRKETT.

IN the volume of these 'Reports' published in 1866 I related several cases of cartilaginous growths developed in immediate relation with the bones of the skeleton; thus forming tumours composed of cartilage, and springing from the surface, or in close relation with the cancellous texture, of otherwise healthy bones.

We may, therefore, now proceed to the examination of tumours containing cartilage developed in the connective tissue, and which are formed either between the organs of the body, or within the organs themselves.

Cartilage is met with in new growths formed upon or within the parotid and submaxillary glands, in the neck, in some other superficial and deeply-seated parts of the body, in the testis, ovary, breast (?), lachrymal gland, and the lungs.

Cartilaginous parotid tumours.—The most common sites of these new growths containing cartilage are the sides of the face

and the neck, in the regions occupied by the parotid and sub-maxillary glands. They are developed on the outside of these organs as well as between the lobes composing them. Hence their common designation cartilaginous parotid tumours.

The structure of these tumours differs very materially from that of those large masses of cartilage described in Series V. In many of those the entire substance of the tumour was found to be cartilage. In these that tissue is disposed in an almost granular form, in many instances, or in small nodules held together by a very characteristic fibre-tissue. The cartilage sometimes shows, when examined with the microscope, all its ordinary features, and very often the stellate-figured cells, whilst the outline of the fibre-tissue is not like that of the connective or filamentous, but appears much finer, straight, and sharply defined in single threads, crossing each other in different directions. The cartilage is often very sparingly dispersed throughout the tumour, or may even abound in one part of it and be scarcely recognisable in another. As a rule it does not appear more distinctly, as if it were more perfectly formed, in the centre than in the superficial regions of the growth; nor have I been able to ascertain any definite relation between the age of the growth and the formation of the cartilage it may contain. In several old large tumours, after some years' development, the structure in the centre did not vary in any essential points from that composing the surface, or that of half an inch in depth within its outermost limits. And in young, small; recently observed growths, removed within a year after the first notice made of them, the minute elementary composition was not different from the structure of the older ones.

The slow growth of these tumours is illustrated by the specimen in the museum, 1654⁸⁴, presented by Mr. Price, of Deptford. It is of fibro-cartilaginous texture, was growing beneath the lower jaw in a man seventy-six years old: the commencement of it was noticed twenty-seven years before his death.

Another specimen, prep. 1539⁵⁰, measuring about five and a half inches by five, with a thickness of about four inches, grew on the right side of the neck of a man for thirty-six years, and was successfully removed by Sir A. Cooper when the patient was sixty years old. That operation was performed in 1806.

The man left the hospital in a month afterwards quite well. It is recorded that the tumour extended from the lobe of the ear, which was involved in it, as far forwards as the maxillary artery (facial?), where it crosses the jaw, and inferiorly to the clavicle. It was perfectly moveable, gave no pain, and had increased during the last two years as much as during the whole period. The structure is granular, its outside is very irregular, and it appears to be breaking up in its centre. The vessels on the surface were of considerable size, and required a ligature as soon as divided (Old Museum Book, No. 71).

A second specimen (prep. 1540), also successfully removed by Sir A. Cooper from beneath the lower jaw, was of formidable proportions; as the cast (208) shows that the tumour occupied the entire right side of the neck, reaching from the horizontal ramus of the lower jaw to the clavicle. Its surface is extremely nodulated. It measures six inches by six transversely and vertically, and is about five inches thick. A section shows that the nodular appearance is only superficial, and is not an indication of a lobulated internal structure.

The record of these successful operations is highly interesting: for in the days when they were performed, and without chloroform, the undertaking must have been regarded as most formidable.

The following case is another example of one of these tumours, and the illustration to this paper, Plate I, is a copy of the original drawing by Canton. It shows remarkably well the irregular outline of the surface of these growths, the pendulous appearance they assume when of large size, and the perfectly healthy texture of the integuments; the only change being that which cannot be delineated here, a deeper tint of red due to vascular congestion or turgescence of the superficial veins. This case is illustrated by prep. 1541⁶⁰, and drawing 51, and the history is copied from a record in the 6th 'Green Inspection Book,' p. 105, by Dr. Hodgkin.

A married woman, æt. 48, was admitted on 11th July, 1828, under the care of Mr. Morgan, with a very large tumour at the right side of the face and neck. It was first noticed about fifteen years prior to her admission, and when she was about thirty-three years old. It was hard, moveable, and of small size, in which state it remained nearly or quite stationary till about

the last two years, during which time it increased rapidly in spite of the means employed to check it, of which the assiduous use of iodine was the principal. The size and situation of the tumour as it appeared when she was in the hospital will be best understood from an inspection of the cast 210, and drawing (see Plate I). It was equal to, or even exceeded the size of the patient's head. Its attachment was broad, extending from the ear, which it displaced to a considerable distance down the neck, and from beneath the jaw to the back part of the neck. It was but slightly moveable. Its surface was nodulous or tuberosc. The integuments though stretched were not discoloured, except that the prominent parts were marked by numerous finely injected vessels. Some of these prominent parts on examination with the finger excited the idea that they contained fluid. Some doubts were entertained respecting the malignant nature of the tumour. From its character it pretty evidently possessed a structure dependent on cysts. There was a diversity of opinion as to the propriety of attempting its removal, but it caused so much inconvenience to the patient that she desired the operation, which Mr. Morgan determined to attempt as soon as the state of the health would allow it. From the extensive attachments of this tumour, and still more from the importance of the parts over which it was situated, the operation necessarily occupied a considerable time, but it was dexterously effected with very little loss of blood. With the exception of a small part of the parotid gland deeply situated between the mastoid process and the jaw every portion of suspicious structure was removed.

Before the operation the patient was habitually thirsty, and subsequently to it this symptom continuing made her urgent in her calls for drink. She drank little but water and tea, but of these she was not content with sips, but took a sufficient quantity to excite vomiting, which was relieved by an opiate, but frequently showed a disposition to return. The febrile excitement which accompanied it to a great degree subsided, the bowels were relieved by injection, and for several days the patient seemed to be doing remarkably well, the wound had a promising appearance, and Mary Jones was allowed to quit the room, which she had had to herself, and return to the ward.

Her appetite, both for solid and liquid food, was very un-

manageable. Diarrhoea came on, which was mainly to be attributed to error in diet, and she was carried off on the eighth day after the operation.

The account of the necropsy is in the words of Dr. Hodgkin.

The head was not examined.

Adhesion had made considerable progress in the wound; the thin layer of coagulum which partially existed between the flap of the integument and the muscles was of a dark colour, but firm and strongly adherent.

Chest.—Both pleuræ were nearly or quite free from adhesion. On the right lung were some small, very superficial, white spots, which were probably allied to the tumour. The substance of both lungs was of a light colour, and not at all speckled with black pulmonary matter. The air-cells were somewhat dilated. The heart and pericardium were healthy.

Abdomen.—The peritoneum offered nothing remarkable except a very few small white lardaceous tubercles upon the intestines and mesentery. The mucous membrane of the stomach was generally of a pale ash colour, with a little dendritic injection. It was somewhat thickened. That of the duodenum pale with some partial dendritic injection, that of the rest of the small intestines generally healthy. In the large intestines it was pale, but thin and extremely soft, so as to admit of its being separated in the form of mucus under the pressure of the finger. The other viscera presented nothing requiring notice.

Tumour.—The tumour on being laid open presented a large cavity filled with a thin, dirty brown fluid; the sides of the cavity were of the same colour, they were very ragged, and presented numerous tender membranous cells, which were evidently the remains of broken-down cells which had lost their vitality. The parietes varied in thickness from one inch to upwards of two; they were generally of a light whitish colour, and evidently made up of cysts containing smaller cysts mostly filled with a fine lardaceous substance, but in several there was a clear, colourless, ropy mucus. Some of the membranous cysts were highly vascular. The inferior order of cysts were so tender and adherent among themselves, and the substance which they contained was so dense, but friable, that they did not afford the best specimen on which the structure could be shown.

The following cases have been admitted into the hospital

more recently, and although of diminutive dimensions in comparison with those already described, are striking examples of these growths.

CASE 1.—A woman, æt. 48 years, residing in the provinces, who had always enjoyed good health, was admitted into Dorcas, under the care of Mr. Cock, in 1854. Fourteen years since she felt a swelling in the right side of the face, just in front of the ear, which slowly increased at first, but more rapidly the last two or three years. The whole of the right parotid region was deformed by a tumour superficially situated, with an exceedingly irregular nodulated surface. It gave no pain—not even when pressed. Through a single vertical incision of the integuments Mr. Cock enucleated the tumour from its delicate capsule; very little bleeding occurred. The growth extended from the malar bone above, to the lower border of the horizontal ramus of the lower jaw below. A section through its longest axis measured four inches, transversely it was two and a half inches.

The nodulated external surface was very characteristic, but the section exhibited a uniform smooth internal construction, without lobulation. It was of a pearly hue, and very bloodless. It was composed of fibre tissue and nodules of cartilage. The drawing in the museum, 19777, depicts the external surface of the tumour and a surface section with great fidelity.

CASE 2.—H. S., æt. 29, a labouring man, was admitted into Naaman ward under my care on account of a tumour in the left parotid region. It was very hard, slightly lobulated, moveable and painless. He attributed its origin to a blow received thirteen or fourteen years before. The tumour was first observed twelve years since, had slowly increased, and even now was merely unsightly. It covered the whole parotid gland. Excision was performed, and the wound soon healed. The growth was not deeply seated, but enclosed in a very strong fibrous capsule. It measured about one and a half inch by one inch.

Its section was smooth, homogeneous, and of a pearly hue when first cut; but exposure to the action of the air soon changed its surface to a pale red tint. The minute elementary composition of the growth was an abundance of a delicate fibre tissue, with interspersed islets of granular cartilage.

A drawing, 1977⁶, and the preparation, 1784³⁵, in the museum at Guy's, afford good illustrations of this kind of growth.

CASE 3.—A healthy-looking woman, æt. 27, was in Dorcas ward, under the treatment of Mr. Cock, in 1862. Seven years before admission she observed a swelling below the right angle of the lower jaw. It gradually enlarged, caused no pain, became more and more nodulated upon its surface, and at last proved inconvenient and very unsightly. The tumour was very moveable, firm, and but slightly attached to the surrounding parts. At the lower border there seemed to be a cystiform development. Mr. Cock excised the growth.

The drawing in the museum, 51²⁰, and preparation, 1539³⁵, illustrate very forcibly the characteristic nodulation of the cutaneous surface of these new growths. The section demonstrates that these nodules are not represented by deep lobulation of the substance of the tumour, for it shows a nearly uniform, smooth, homogeneous surface, bright and glistening when recently cut, and here and there of a pearly aspect. This appearance is due to the small nodules of cartilage. Its length was about four and a half inches, its greatest breadth two and a half inches. The minute elements were fibre tissue and cartilage. Well-marked cysts containing a blood-tinged serous fluid were seen at the extremity of the growth where the presence of fluid had been detected before its enucleation.

CASE 4.—A lady, æt. 20, consulted me on account of a swelling in front of the left ear, which had been slowly increasing four or five years. It gave no pain, but produced a visible elevation of the integument, which was, however, perfectly healthy. It was first accidentally felt at about the age of fifteen. The firm, nodulated structure of the tumour, combined with its mobility, rendered the diagnostication of its composition easy. Excision was effected, and the wound healed in forty-eight hours. The new growth was about an inch in its longest diameter. It was loosely attached to a delicate fibrous envelope, from which it was easily separated with the handle of the scalpel. Its elementary composition was fibre tissue, with minute points of cartilage interspersed throughout.

CASE 5.—In September, 1857, a girl, æt. 16 years only, was admitted into my ward on account of a tumour situated behind the left angle of the lower jaw, over the parotid gland, the progress of which had been watched for five or six years. Thus the growth was first noticed at the early age of between five and six years. After its excision it was found to be composed of a granular cartilage held together by fibre tissue.

CASE 6.—A similar case was admitted into my ward in February, 1858, the girl being 17 years old, and the tumour three years. The growth was enclosed in a rather distinct cyst, and was quite superficial.

These cases, and other preparations and drawings in the museum (prep. 1361⁴⁶; drawing, 1977⁸; and preparation, 1361⁴⁷), afford good examples of the origin, progress, and treatment of the fibro-cartilaginous tumours so commonly met with in the parotid or sub-maxillary regions. They are generally developed at early periods of life; their growth is slow, attended with scarcely any inconvenience until they reach a large size, and they are harmless as regards any hurtful influence on the structures in their vicinity.

They may be readily recognised by their nodulated surface, for even when very small they are remarkable by this feature; and by this characteristic they may be distinguished from an enlarged lymphatic gland, which is usually particularly regular in its outline. Sometimes seated superficially to the parotid, at other times apparently commencing between its lobes, they are more or less firmly and intimately confined within the limits of the fibrous envelope of the gland, according to these conditions. And the chief importance of this fact is with regard to the section of some of the glandular structure in the operation of excision, when partially encompassed by the gland lobules. For, should the minute ducts be divided, a fistulous opening might remain when all the rest of the wound is healed. The opening may be excessively minute, only just visible, but yet sufficient to be inconvenient, by allowing the escape of saliva during every act of mastication. Such tiny apertures will sometimes close and remain so for months, and re-open at intervals, for many years subsequent to these incisions of the salivary glands.

The only method by which to eradicate these tumours is excision. This operation should be always undertaken when the growth is small, especially as in the early stage a very small incision is required, and the facility of detaching the new formation is remarkable in comparison with that of older ones. A single vertical incision of the integument is alone necessary; the capsule should be carefully incised along the superficial surface of the tumour, and to about $\frac{1}{8}$ of an inch in depth into it, in the same direction, and the handle of the scalpel may be successfully employed to enucleate it with the occasional assistance of a few touches with the blade to divide the more resisting fibres. The surface of the wound should not be touched with any foreign body, but the blood expressed by gentle pressure at its sides, and the bleeding arrested by cold applied to the neighbouring parts. The wound ought not to be finally dressed until the entire cessation of the flow of blood. Then its edges may be maintained in contact with plaister made adhesive by resin or albumen, an opening being carefully left at the lowest edge, a graduated compress applied over it, and union by adhesion may be obtained in twenty-four hours.

When the entire growth has been completely removed a favorable prognosis may be anticipated.

Cartilage in the testicle.—This tissue is frequently met with in some of the new growths affecting the testis. For many years there has been a specimen in the museum in which this gland appears to be changed into an entire mass of cartilage. The preparation is numbered 2362, and is quoted by John Müller in his work. I remember Mr. Key stating that the patient from whom it was removed died subsequently of cancer; and there is at the lower part of the section, as it hangs in the bottle, one portion of the surface which resembles the structure of cancer after long immersion in spirit. The shape of the testis, in section, is still well preserved, the new growth is entirely circumscribed by the tunica albuginea, and its longest diameter measures about three inches.

But cartilage does not commonly form so uniform and regular growth in this organ. It is most commonly disposed in lobules, or even in tiny granules, interspersed with fibre-tissue,

cysts, strumous deposit, and soft cancer. The following cases illustrate such an arrangement:

CASE 1.—In 1854 I assisted Mr. Cock, who removed the left testis of a gentleman between thirty-nine and forty years of age, and whose general health was somewhat impaired. He had observed for five months slow but progressive increase in size of the affected organ, which he attributed to a hurt. The shape of the organ was not changed, it was simply larger than the other, but at one spot, where a puncture had been made with a trocar, some sprouting granulations had appeared. It was hard and resisting in all parts, with that elasticity peculiar to a distended tunica albuginea. The inferior division of the spermatic cord was slightly enlarged, and the deeper seated iliac glands were rather more distinctly felt than when in a perfectly healthy state. The testis and about an inch of the cord were removed. The disease was entirely confined to the body of the organ, stretching the tunica albuginea and bursting through it. The epididymis was healthy, merely spread over the testis. The tubuli testis were not traceable. The new growth was composed of cysts, cartilage, and a material which looked like strumous deposit, which was really dead cancer tissue. The patient subsequently died of abdominal cancer. Drawing 416⁵².

CASE 2.—A man, æt. 39, was admitted under Mr. Key in January, 1849, on account of disease of the right testis, to which his notice had been attracted about two months. He was a hard working man, and had had angular curvature of the spine from boyhood, resulting from a cured abscess in the back. Over the surface of the testis were hard and soft points. The former spots were like cartilage, the latter as if fluid was contained in cysts. The organ was about double its normal size, and there was not any unusual accumulation of serum in the tunica vaginalis. It was not painful, nor had he pains in the loins. His general health was as good as usual. One of the soft spots was punctured, but no fluid escaped. The tumour slowly increased, and in March Mr. Key removed it. The spermatic cord was quite healthy, and the disease was confined entirely to the body of the testis; the epididymis was expanded.

The softer structures were considered to be cancerous, and the hard were cartilage. The wound healed favorably, and the man left the hospital. In October following the man began to complain of pain in the loins, which increased slowly; his liver enlarged from carcinoma; he became dropsical, and died the following year.

CASE 3.—The various forms which cartilage tissue assumes in association with other new growths in this organ are well displayed in other preparations and drawings in the museum. Preparation 2362⁷⁰, and a drawing 417⁶¹, made whilst it was fresh, show a large and fine example, with masses of cancer, of the nature of which there could be no question. The cartilage tissue is also well marked, and very characteristic, especially at the border of the tumour. In this are also a few cysts.

CASE 4.—Another specimen, preparation 2362⁹⁰, drawing 417⁶⁰, shows quite a different arrangement of the cartilage growth, which is mixed with much tough fibre-tissue. The small nodules of cartilage are arranged in patches. The tumour is large, was very hard, and did not seem to be associated with any cancer growth. It was removed by Mr. Cock in November, 1862, from a patient thirty years old, in the enjoyment of otherwise good health, and it had been growing about six months.

Cartilage and bone may be found in tumours developed in the connective tissue, between the muscles, without any traceable connection with the osseous system at the time of their removal.

CASE 1.—A very beautiful specimen in the museum of such a tumour, removed by Mr. Key from the neck of a young woman, composed of fibro-cartilage and bone, is about three inches by two and a half inches in its vertical and transverse diameters. It possesses a rather smooth, regular external surface. The section shows, to use the words of Dr. Wilks, "a bony shell, which is very dense, and sends processes inwards, and between these there is a tough fibro-cartilaginous tissue.

It differs from ordinary forms of bony growths." Catalogue of museum, preparation 1361, and a very beautiful coloured drawing by Canton, No. 37¹⁰.

CASE 2.—Another highly interesting specimen in the museum, 1399²⁰, consists of an osteo-chondromatous growth on the surface of a healthy, adult heart. A drawing of this was made in October, 1856, 38²⁰, for it is an old specimen, without a history, and was obtained at the sale of Mr. Brooke's collection.

CASE 3.—A curious tumour, composed principally of fat, it is true, but with nodules of cartilage interspersed throughout it, was removed by Mr. Key in 1848. The specimen, preparation 1652²⁷, is about two inches by three in diameter, has not very irregular surfaces, and the section shows projecting nodules of cartilage in fibre-tissue, containing much fat. The patient from whom this was removed was a healthy woman, about twenty-five to thirty years old, in good health. It was growing in the posterior region of the upper third of the leg, between the gastrocnemius and soleus muscles.

CASE 4.—An isolated mass, of large size, composed of more bone than cartilage, was developed in the posterior femoral region of a woman, from whom I removed it in February, 1858. The history of this singular case is from notes taken by Mr. Buckmaster J. Tuck. A married and prolific woman, the wife of a working man, felt, accidentally, in the twenty-eighth year of her age, a firm hard "kernel." It was then about two inches in diameter, and in the posterior, outer, femoro-popliteal region of the left leg.

She was under my treatment when the tumour had been growing about two years and four months. Occasionally she felt aching and shooting pains in the part after exertion. Its increase had been slow and steady. The general health was good; the lymphatic glands were not affected; there was no history of inherited tendency to new growths, nor was the patient disposed to attribute the formation to any assignable cause.

The tumour was situated close to the inside of the short head of the biceps femoris muscle, and extended inwards towards the inner hamstring muscles. It projected slightly backwards, causing

a general fulness of the popliteal space. It was beneath the fascia, and the artery passed along its inner side. The skin over it was quite healthy and not discoloured, although a few cutaneous veins were slightly varicose. Not the slightest attachment to the femur could be discovered; on the contrary, when the muscles were quite relaxed, the tumour was moveable in every direction to a limited extent. It resisted strong pressure, which caused no pain; and from the touch it could only be considered of bony texture. Its surface was quite smooth. The patient was anxious to have the tumour removed, as it was becoming inconvenient from its size. I made, therefore, a vertical incision directly over the centre of the growth, and carefully detached the fibrous envelope by which it was invested from its surface. The excision was easily effected without seeing any of the neighbouring structures except a few fibres of the short head of the biceps, and with a very trivial loss of blood. The wound speedily healed, and the patient was never afterwards troubled in that region. In the early part of 1860 she became phthisical, and died in May, 1861, three years and three months after the operation. There were no visible signs of tumours in any part of the body, but it is to be regretted that a post-mortem was not made. I did not hear of the woman's death until some months after that event.

The tumour, preparation 1376³⁵, was so hard that a saw was required for its section, but there was much cartilage interspersed with the bone. Its outer surface was tolerably regular, and there was neither a bony nor cartilaginous outside casing, but both tissues were mingled together without apparent order or marked arrangement. The osseous element preponderated. The section when recent had a greyish, pearly tint. About two thirds of the tumour consisted of bone, which was densely compact in some parts and cancellated in others. A delicate envelope of fibre tissue surrounded the whole. It measured five inches in vertical diameter, three in the transverse, and about two and a half from front to back.

The conversion of an ordinary ganglion or bursa on the sheaths of tendons into a growth of fibre-tissue, cartilage and bone cannot be very common, as I have only met with one case of the kind. The following are the details:

CASE 5.—A lady, æt. 22, showed me a tumour on the dorsal aspect of the left carpus, which had been growing there for eleven years. It was exceedingly hard, movable, projecting, and unsightly, although painless. Being composed of several nodules, its outline was irregular, and its long axis extended obliquely over the tendons of the two extensors of the wrist-joint. One nodule felt softer and more yielding than any of the others, and might have been taken for a very tense bursal cyst. With the assistance of Mr. Frederick J. Toulmin I removed this growth, which was carefully separated from the tendons beneath. They were fully exposed, but very little interfered with. A splint was used to keep the wrist-joint immovable, and the cutaneous wound healed by adhesion. The movements of the articulation were in no degree impaired.

The growth consisted of lobules of cartilage and small developments of bone of very delicate cancellous tissue, loosely held together by dense connective tissue. The separate growth above referred to, which felt like a cyst, was composed of fibre-tissue purely.

Plate II, fig. 1, is a copy of the drawing, 6⁵⁰; and the preparation is in the museum. The drawing, being coloured, of course shows the textural differences between the bone and cartilage better than the lithograph.

With the view to illustrate the osseous skeleton of some of the large cartilaginous masses developed about the pelvic bones, I have introduced a copy of a photograph made of a specimen, preparation 1132⁵², in the museum. The case was quoted in a former paper (vol. xii, 1866, p. 399). On Plate III, fig. 2, at the end of this communication, the dorsum of the ilium is displayed, *a*, with two large, coral-like growths projecting in high relief from it. The necessarily reduced size of the illustration detracts somewhat from the extreme delicacy and beauty displayed in the structure of the original, and without another view of the opposite side of the preparation, it was impossible to show how the venter of the bone is almost entirely encrusted by a continuation of that growth marked *d*, which springs from the crest of the bone. The almost circular, fungus-shaped growth, *c*, is perhaps the most attractive, and seems, on a profile view, as if traversing the thickness of the original bone.

A very characteristic feature of this specimen should be carefully noted. Nowhere do we observe any destruction of the original bone, such as is so commonly observed to affect bones surrounded by cancer, even when new bone may be developed concomitantly with that formation. We have to note a large amount of delicate spongy bone structure, but there are none of those excavations accompanying it which are always to be found in bones involved in cancerous growths. The student may compare preparation 1132⁵⁴ in proof of the above remarks. The ossa innominata present numerous excavations and hollows. Also similar disease in the bones of the cranium, preparation 1081⁴⁵, and of the scapula, preparation 1098¹⁰.

Even in the large mass of cartilage developed about the scapula, preparation 1098²⁵, related in my last paper (vol. xii, 1866, p. 403), the outline of the scapula was fully preserved in almost the centre of the new growth, so far as the section admits of its recognition.

Exostoses.—Of fifty cases of bony growths removed by my colleagues and myself since 1857, they were developed on the bones in the following proportions :

Head, frontal bone	1
Jaw, upper	1
Epulis on upper jaw.....	3
Jaw, lower	2
Epulis on lower jaw	2
Trunk, rib	1
Upper extremity, scapula	3
humerus.....	8
first finger.....	1
Lower extremity, femur.....	9
tibia	4
tarsal bone.....	1
metatarsal bone	1
ungual phalanx, great toe	12
sole of foot.....	1

Among these specimens were seen the usual varieties of such growths. The one developed on the frontal bone (of a man, 22 years old) was excised by Mr. Cock. It was of ivory-like hardness, and required great exertion on the part of the operator to detach it. The structure of the bone excised

resembles that of the bony growth, in the case reported by Mr. Hilton, which fell out from the region of the superior maxillary bone of a man where it had been growing twenty-three years.¹ It may be of interest to add that this man showed himself at Guy's in 1865, that is, about thirty years after the separation of the bone. He enjoyed as good health as privations permitted, and the only annoyance he experienced from the hole in his face arose from the disfigurement it occasioned.

Whilst upon the subject of these remarkable bone growths on the face, it may be useful to note a similar case reported by M. Michon,² in which one of three years' development, beginning in a male at the age of between fifteen and sixteen years, was successfully removed, not, however, without a great deal of trouble.

The jawbones, upper as well as lower, frequently have exostoses developed upon them. Most frequently, however, these grow from the alveolar processes, and, forming upon the gums tumours of remarkable appearance, have long enjoyed a special name which only identifies them with their situation. These outgrowths, or certainly most of them, if not all, are really exostoses. Proof in support of this statement I hope soon to afford. But bone, forming tumours, is met with growing out from the compact tissue of the horizontal ramus of the lower jaw. It is usually of the same structure as that part itself, and very hard. The only one I have seen had a broad base, and produced a fulness of the soft parts over it. Extending all round the inside of the lower jaw of a man between sixty and seventy years old, close to the necks of the teeth, which were perfectly healthy, I have seen several exostoses projecting into the mouth from about one eighth of an inch to a quarter in relief, some being sessile, others disposed to assume a somewhat narrow base and club-shaped or bulbous extremity. A small specimen of such an exostosis is seen on the palatine side of the posterior extremity of the alveolar process of the right upper jaw, above the last molar tooth, in preparation 1074¹⁵. Two rounded exostoses are there placed, projecting inwards about one eighth of an inch.

We possess in the museum some curious specimens of

¹ 'Guy's Hospital Reports,' vol. i, p. 493.

² 'Mém. de la Soc. de Chir. de Paris,' t. ii, p. 615.

exostoses developed on the outside of the cranial bones, as well as on their internal surface and in their substance.

The preparation 1074⁸⁰, of which there is no history (Plate IV, fig. 1) displays numerous large and extensive exostoses on the outer surface only of the occipital bone. They are central and lateral, running in vertical projections, with deep furrows between them. They are placed on the surface of the bone, between its two curved lines. The section shows the structure of the central exostosis. At *a* the bone is very compact and hard. At *b* the cancellous tissue is shown, which extends upwards in continuation with the diploe of the remainder of the bone. On the right side of the frontal bone of the same skull there is one small exostosis, and another at the junction of the right parietal and frontal. Both rise above the surface in low relief.

Specimen 1074⁸⁵ (Plate IV, fig. 2) shows a smooth, compact, somewhat pedunculated exostosis behind the foramen magnum. There is a deep furrow between it and the occipital bone. It measures $1\frac{3}{8}$ inch in its antero-posterior direction, about one inch transversely. The whole outgrowth may be divided into two parts, a larger posterior, *a*, and a smaller anterior, *b*. Between them the bone is furrowed. Its general outline is egg-shaped, and it projects in relief from the occipital bone about six eighths of an inch. The letter *b* indicates a smooth surface on the smaller division of the growth, which has all the appearance of an articular surface, being quite polished. It measures six eighths of an inch transversely, and five eighths from before to behind. In this last direction it is concave. It is probable that in the movements of the head this surface rubbed against the spinous process of the second cervical vertebra. A fact, to a certain extent resembling this one, is recorded by Mr. Toynbee, who showed at a meeting of the Pathological Society an abnormal articulation of the right jugular process of the occipital bone with the transverse process of the atlas.¹ Probably this was an exostosis from the jugular process.

I would here refer the reader to a most remarkable case of bony tumour developed from the occipital bone of a man who, in spite of the affection, attained the age of eighty years. It began to grow at six years of age. It was at the time of his

¹ 'Trans. Path. Society of London,' vol. ii, p. 93.

death of an oval shape, and measured 1 foot 11½ inches in its greatest circumference; from ear to ear, 1 foot 7½ inches; from above to below, 1 foot 9 inches. The weight of it was ten pounds. Its internal substance was bone, as hard as ivory, which contained cells.¹

A very remarkable deformity of the occipital bone, resembling an exostosis, may be seen in the specimen 1074²⁸. The projection might, during life, have been mistaken for an exostosis.

Passing to the frontal region, we find on a piece of a frontal bone, preparation 1074²⁹, a small exostosis projecting about a quarter of an inch in relief from the outer table, one inch above and slightly to the inner side of the centre of the left supra-orbital ridge. It must have been very perceptible during life, and might have been easily excised.

Another specimen, 1072³⁰, is a fine example of an osseous protuberance occupying the site of the centre of ossification on the left side of the frontal. The morbid condition associated with the external growth extends through the bone, although there is no internal projection. The elevation produces a thickness of bone of about six eighths of an inch in the thickest part, which is not the true centre. The vertical and lateral diameters measure three inches. The tissue of the growth is very hard, and resembles a mass of compact bone tissue. In the section this is quite white, and it forms a marked contrast with the yellow, greasy, cancellous tissue of the diploe between the tables of the skull at either end. The distinctive marks between diploe and tables are entirely merged in a uniform smooth surface, blending off, however, laterally into the ordinary arrangement of those structures in the cranial bones. It would have been extremely difficult to have removed any portion of this growth from a living person. The state of the bones is allied to sclerosis in other tissues, with the addition of excess of growth.

The only well-marked case of exostosis on the parietal bone I have seen occurred in a woman, sixty years old, about the region of its centre of ossification. It was one inch in diameter, about one fourth of an inch in relief, and had been observed twenty years. She complained of the shooting pain it caused.

¹ Bruns, Dr. V., 'Handb. d. Praktisch. Chir.,' 1ste Abth., s. 99; Atlas, t. i, fig. 9—11, 8vo, Tübingen, 1854.

But I must not omit to notice the remarkably fine specimen of exostosis from the right parietal bone, shown at the Pathological Society in 1850 by Dr. Quain and Mr. James Ilott. The patient died at the age of forty, of disease of the liver and kidneys. The tumour had been growing twenty-six years, and, therefore, commenced about the age of fourteen,—as the result, it is said, of a contusion. Its pedicle consists of compact tissue, its bulk of cancellous. The point of practical interest is, that it was really attached to the normal bone by a comparatively small pedicle, although its apparent base was very large.¹

Specimens of exostoses from the internal table of the bones of the skull are represented by the preparations 1073, 1073⁷⁵, and 1074. I have selected the last for an illustration, Plate IV, fig. 3. The two first were the calvaria of lunatics. The last was from a patient who had suffered from tic douloureux. This is a very fine specimen, and resembles, although it is far superior in the amount of new bone development, one in the Musée Dupuytren, No. 372, Atlas, Plate XV, fig. 5, of which there is no history. The bones are very heavy. The outer table is distinct in every respect. But the growth of new bone, consisting chiefly of cancellous tissue, springs from and is continuous with the diploe, all trace of the internal table being lost, except at the sides of the skull. The thickest part in the left frontal region measures three quarters of an inch; in the right frontal, half an inch. A fresh section has been recently made, which shows the structure of the new growth better than the lithograph represents it.

An early stage of exostosis developed on the nasal processes of the superior maxillary bones is shown in the drawing 4²⁸, which represents a man, æt. 60, with two swellings on either side of the nose. These tumours had been painlessly growing thirteen or fourteen years. They encroached on the nasal chambers and orbital fossæ of both sides.

This may be regarded as an earlier stage of that condition of the bones of the face of which there is a remarkable specimen in the Musée Dupuytren, No. 384, represented in a lithograph by C. O. Weber.²

¹ 'Trans. of the Path. Soc.,' vol. iii, p. 149, and plates ii and iii.

² 'Die Knochengeschwülste, &c.,' taf. v, fig. 7.

Also, in the museum of the Royal College of Surgeons of England, there is an example of a similar disease, 3236A.

Exostosis from the alveolar processes and laminae of the jaws.

—New growths forming on the gums of the upper and lower jaws, and termed “Epulis,” are not very uncommon. They often assume the appearance of “malignant disease,” especially when their surface becomes ulcerated, or when they appear to grow from the interior of the lower jawbone, and expand its walls.

But such growths are essentially exostoses, springing from bone; although, in many instances, pushing before them the overlying gum structure, they produce by irritation an excessive growth of that structure, and appear as a formidable disease. No wonder, then, that in former days severe operations were performed to eradicate such growths. Our museums contain numerous specimens, in which, together with the new growth, more or less of the jawbone, from which it was growing, was excised. On Plate II, fig. 4, the larger part of the horizontal ramus of a lower jaw is represented in section. It is copied from a drawing in the museum, 4⁵⁶¹, and shows an “epulis” attached to the cancellous tissue of the bone. Also, a preparation (1091²⁸) displays even still better the relations between the bone and soft parts in this disease. Having examined a great number of these growths I may state that I have never met with any other tissues in them than bone, myeloid structure, and gum-tissue, that is to say, fibre-tissue, gingival glands, and a layer of epithelium more or less thick. The fibre-tissue is sometimes rather dense, almost fibro-cartilage. They are often rather vascular, more so than the tissue of the gums, and when ulcerated bleed freely. To their vascularity is due their bright red colour, so often leading to the supposition that the growth is cancer. As the source of the growth is its bony attachment, it is only necessary to cut this away freely, in order to cure the complaint. When the pedicle is attached to the surface of the alveolar process, or one of the laminae, this operation is easily accomplished; but, when the tumour springs from between the plates of the lower jaw, for example, a greater difficulty arises in its execution. To eradicate the growth it is then necessary to excavate the cancellous tissue of that bone.

The following cases show that these growths may be developed at the earliest and middle periods of life, but that they will be most frequently met with in early adult life.

As an explanation of the cause of their formation, that is to say, of the cause of the outgrowth of the bone, the history given by the patients would point to some source of irritation set up in the alveolar process by the extraction of a tooth, whilst at the same time it is open to the suggestion that the tooth might have been itself hurt or irritated by the presence of the growth in an early stage of its development.

There is only one method to be adopted to eradicate the growth. That is, excision. The operation must be carefully performed, great attention being paid to the complete removal of the piece of alveolus whence the growth springs. Against the old plan of excising a portion of the ramus of the lower jaw I can scarcely write too strongly, since the operation is one attended with great risk, and is perfectly unnecessary. Even the entire alveolar process, and some of the cancellous tissue of the ramus, might be excised before that operation should be done.

The earliest age at which I have seen a growth of this nature was in the case of a private patient, a female infant seventeen months old. It occupied the front of the gum before the second left incisor tooth of the lower jaw. The mother of the infant noticed the redness about six months before, just prior to the appearance of the incisor teeth. It had the appearance of a smooth wart, but was rather more vascular, and about one fourth of an inch in diameter and broad based. The tooth before which it grew was pushed backwards by it. The patient was otherwise healthy.

I excised the growth with a pair of forceps, having to cut through the bony pedicle by which it was attached to the alveolus. The soft parts covering the bone were fibre-tissue and epithelium.

Another case occurring at a later period of life than usual is reported by Mr. W. F. Croome, as follows :

"A domestic servant, æt. 37, first perceived a small tumour three months since on the left side of the lower jaw, springing from the gum around the first molar tooth. When examined it was about three quarters of an inch in its longest diameter, and

bulged inwards and outwards in the situation of the first molar, which was removed in consequence of the pain produced by the pressure of the tumour against it. The growth was excised by Mr. Birkett, September, 1853, cutting forceps being used to sever the root of the growth from the alveolar process." The bony pedicle was unusually firm in this case, and the soft tissue composed as before described.

In 1847, a single woman, æt. 22, applied to me on account of a vascular growth, which had been observed on her upper jaw about six months. It commenced as a small red tubercle between the first molar and bicuspid teeth, and had reached about an inch in width. The bicuspid tooth had been loosened and extracted. She was admitted into Charity Ward, and Mr. Cock excised the growth, which had a firm osseous attachment to the alveolus. A section showed a bony pedicle and fibrous tissue in which the cæcal terminations of the gingival glands were very apparent. The wound soon healed, and I know that the patient has never had any recurrence of the disease.

The elementary tissues termed "myeloid," which are commonly met with in new growths connected with the cancellous tissue of the bones, are also seen in these growths. An example of this kind occupied the left side of the alveolar process of the lower jaw of a woman aged twenty-three years. The tumour had been growing about fourteen months from the bony septum between the left bicuspid teeth, which were loosened and separated from each other by its pressure. It was softer than such formations usually are, and resembled very closely the appearance of an "epithelioma." It was, when excised, examined by Dr. Wilks, and he has given a drawing of the myeloid cellules observed in it in the volume of these Reports for 1856, pl. V, fig. 5. The growth never reappeared. Prep. in Mus. 1784⁵².

M. S—, æt. 26, a delicate, strumous, cachectic woman, was admitted under my care into Dorcas in May, 1854. She had been a hard-worked servant, whose labour had been too much for her strength. She was, however, possessed of great courage, and subsequently she displayed remarkable devotion to her duty as nurse in Charity Ward, which occupation she followed for between thirteen and fourteen years after the cure of the

complaint to be now described. Accidentally, about nine months before I saw her, she felt a small lump on the left side of the lower jaw. It slowly increased, and now occupied a large part of the left horizontal ramus of that bone between the last molar and first bicuspid teeth. It pushed outwards the external plate of the ramus, but did not affect the internal one, thus producing an unsightly deformity of the lower facial region. There was a firm growth apparently developed within the jawbone and rising out of it about three quarters of an inch, with an irregular grooved upper surface superficially ulcerated, but a smooth outer one formed by the expanded bone. It had never been very painful. The drawing in the museum, 272¹⁰, affords a very accurate representation of its appearance, as also does a cast made by Mr. Salter. Considering the growth to be innocent, that is to say, composed of fibre-tissue with a bony base, I proposed to myself its enucleation before subjecting the patient to the more formidable operation of excision of the affected part of the lower jaw. A preparation in the museum shows such a growth developed in the lower jaw, and it also demonstrates how very easily such a tumour might be enucleated.

In May, therefore, with a strong scalpel and a gouge, I removed as much of the tissue as appeared to be of new growth, cutting a tolerably hard bony base covered with fibre-tissue and gum. The operation was very painful and borne with great courage by the patient, who declined to take chloroform. The wound healed favourably, although upon one occasion I subsequently removed some tissue which had the appearance of being a small piece of the original growth. No further trouble, however, arose, and I had the satisfaction of seeing the patient for many years afterwards quite free from any fresh growth in the part. The outer wall of the lower jaw never entirely resumed its normal shape. The woman died in 1868 of phthisis, and circumstances prevented me obtaining an examination of the jaw.

The growth excised in this case was clearly an outgrowth of bone, as a nucleus, covered by an abnormal development of fibre-tissue. It was very firm, and neither so vascular nor so succulent as such growths occasionally are.

In this case we have an admirable example of the good which may be effected by confining the operative interference to the

new growth, exclusively. For, after an examination of several specimens of a like nature contained in museums, in which more or less of the jawbone has been cut away with the tumour, it is evident that the removal of the growth alone would have sufficed to cure the disease.

A domestic servant, æt. 39, was sent to me by my friend Mr. Buée, of Slough, in 1859. She had observed a swelling about the two last molar teeth of the left upper jaw after "toothache." One had been removed, since which the growth had appeared. It extended backwards, was about one inch in its longest diameter, and projected inconveniently into the mouth. Four months ago it prevented complete closure of the lower jaw. Its surface was soft and superficially ulcerated, its base firmly fixed to the jawbone. The tumour had been growing about one year. I excised it, but had to cut through its bony attachment. The wound healed, but in about four months another small growth had formed. This was carefully removed, since which there has been no reappearance of the disease. The first growth removed consisted of bone, fibre-tissue, and a layer of epithelium. Dr. Wilks was good enough to examine the disease and give me the following account of it. "The white surface of the specimen appears to consist of an epithelial growth arranged in a papillary form. The white structure immediately beneath this consists of a dense connective tissue containing nuclei, and which resembles fibro-cartilage. The red substance which is soft is an excellent specimen of myeloid structure, the large cells being remarkably well displayed. Within the latter is some bone." This patient has now been quite free from recurrence of the growth for nine years.

But the two most pedunculated alveolar exostoses I have met with occurred this year, one in private practice, the other in the hospital.

A gentleman, æt. 32, had the last but one left upper molar extracted on account of caries. His attention was drawn to a swelling in its site about twelve months afterwards. It never hurt him, but about a month before I was consulted he noticed a red swelling, and that the last molar tooth was being pushed

towards the cheek. Thus this exostosis had been in process of formation for two years at least. Its bony pedicle could be distinctly felt with the finger, and was supporting the soft tissues like the pileus, or cap of a fungus upon its stalk. It required more than usual force to cut through this bone, which when I examined it appeared to be quite perfectly well formed. Probably, it was the length of time it had been growing which allowed of the perfecting of this tissue.

Dr. C. O. Weber in an elaborate work devoted to osseous growths gives a beautiful illustration of a myeloid tumour, removed from the lower jaw, in which the development of spongy bone tissue extended into the tumour to a very unusual degree.¹

An alveolar exostosis removed by myself in December, 1868, from a patient in Martha Ward, was likewise well seen to grow from the transverse septum between the second bicuspid and first molar teeth. Preparations of these two specimens are in the museum.

Exostoses on the bones of the upper extremity.—Three patients have been the subjects of exostoses on the scapula—a boy twelve years of age, and two girls, one sixteen years old, the other twelve. In the first the growth had been observed four months, in the second three years, in the third one year. The tumours were small, and do not require any particular description.

Eight patients have had exostoses excised from the os humeri. They were four males and four females, all under twenty years of age, except one adult of forty. In one instance the growth was developed on a stump of the bone through which amputation of the limb had been performed. In the museum is a preparation of a femur stump, with an exostosis at its posterior surface close to the linea aspera, 1158⁵⁰.

A large exostosis is displayed in prep. 1100⁷, attached to the outer side of the shaft of the humerus by a broad base, and extending backwards, outwards, and upwards above the attachment of the deltoid muscle, through which it must have been easily felt. Exostoses are not uncommon in this region.

A remarkable lamellar exostosis is seen on the shaft of a right humerus, prep. 1100¹⁰; it grows from an expanded base partially

¹ 'Die Knochengeschwülste,' &c., 4to, Bonn, 1856, tab. v, fig. 1.

enveloping the shaft in front and on the inside. It terminates in a free, sharp, flat edge or crest. Corresponding as it does with the attachment of the upper fibres of the brachialis anticus, it might have arisen from ossification of some of its fibres.

A well-developed example of the supra-condyloid process on the inside of the humerus is shown in the specimen 1100¹⁵.

No case of true exostosis in the radius or ulnar appears in the list. They are very rarely seen on either bone.

Exostoses on the bones of the pelvis.—These bones, more especially the pubic division of the os innominatum, appear to be subject to outgrowths of bone as much as any others of the trunk, if we may regard as evidence of this fact the number of specimens thus affected. On Plate III, fig. 1, the left os innominatum is represented, prep. 1134⁶⁸. It is a very healthy and hard bone. From the visceral side of the horizontal ramus of the pubes a broad piece of bone descends, *d*, which, curving forwards, becomes united by a delicate forked process to the point of junction of the ascending ramus of the ischium and descending ramus of the pubes on the inside. At this spot there is no indication of any fracture of the bone. From the ridge between the spine of the pubes and the acetabulum there is a projecting exostosis, and at the junction of the ramus of the ischium and pubes on the outside more new bone and a crest, which last is not unlike an ossification in place of the tendon of the adductor magnus. There is no trace on the upper surface of the horizontal ramus of the pubes of a united fracture. The curious forked ramifications of bone appear to be ossifications of the obturator ligament.

Another innominate bone, 1128⁵⁰, is particularly interesting, as it shows a very large exostosis in the region of the spinous process of the pubes. It is broad based, and rough at its apex. On its inner side is a fossa which corresponds exactly with the site of the attachment of the adductor longus. Processes of new bone extend downwards to the inner or pubic border of the thyroid foramen, and encroach considerably upon its confines. The bone generally is light and spongy.

Whether this specimen may or may not serve as an illustration of a bony growth in relation with the "rider's-bone," or ossification of the tendon of the adductor longus, or magnus

muscle, it is of great interest in connection with a case I shall now relate. A gentleman, fifty-six years of age, was, in early manhood, much used to riding on horseback, and regularly hunted three days a week at the least, being always well up to the hounds. He has always enjoyed robust health, and is very muscular. Twenty-five years since, when riding in a steeplechase, at about the age of thirty, in the act of charging a fence his horse, refusing the leap, swerved, and he felt something give way "snap" in the upper and inner region of the right thigh. Immediately after he felt he had not his accustomed powerful "grip" of the saddle. In the evening, even so soon after the accident, the thigh was swollen and bruised. It should be stated that he was neither thrown from his horse nor displaced in the saddle. The muscles of the right thigh were very weak for some months afterwards; indeed, the adductors have never regained their wonted power. Both Aston Key and Liston were consulted, and stated that they had never met with a like case. For at this time there existed a bony hardness in the course of the tendon of the adductor longus.

At this time there is a large exostosis in the region of the right spine of the pubes, which extends along its horizontal ramus, and seems to envelope the pubic attachment of the adductor longus muscle. The tendon of this muscle is converted into bone at its root, and extending for three inches downwards in its substance a conical piece of bone is clearly perceptible. The apex of this is pointed, and rounded off at its tip as if cartilaginous. In the tendon of the left adductor longus there exists a similar bony deposit about two inches long, but no exostosis on the pubes. The other adductors are unaffected on both sides.

Dr. Billroth has described an ossification in the tendon of the adductor magnus, which he found in an after death examination of an old cavalry man. It extended in that muscle for half an inch below its attachment to the pelvic bones.¹

Prof. Longmore, C.B., of Netley, informs me that he has seen the "rider's-bone" "but extremely rarely."

A similar local ossification of the soft parts, due to pressure and irritation, is stated to occur in the left arm of the Prussian soldiers, and is termed "exercise bone."²

¹ 'Deutsche Klinik,' 1855, No. 27.

² Virchow, R., 'Die krankhaften Geschwülste,' Band II, s. 72.

Exostoses on the bones of the lower extremity.—Nine patients have had exostoses removed from the femur. Five were of the male sex, four of the female. Not one individual exceeded the age of twenty-seven years at the time, and five were under twenty.

The growths developed on the shafts of the cylindrical bones and termed epiphysial, or sometimes periosteal, are of very common occurrence, and usually grow from small contracted pedicles or long narrow stems. Of the first-named variety I have the opportunity of showing the construction through the kindness of Mr. Poland, who allowed me to make use of a specimen for that purpose. It is a typical one. He removed it from the inside of the lower fourth of the left femur of a healthy-looking girl, thirteen years old. Its age is from five to six years. On Plate II, fig. 2, A, the growth is represented as it appeared immediately after excision. At B we have a vertical section. As, however, the Description of the plate is sufficiently explanatory, I need not here dwell upon its anatomy. The student can refer to the coloured drawing in the museum, No. 15⁶³, and to the preparation, 1152⁵⁰.

Through the kindness and liberality of many contributors, our museum is singularly rich in fine specimens of exostosis on the femur.

As regards recent and young growths, the preps. 1152³², 1152⁴⁸, the last removed and presented by Mr. Parrott, of Clapham, contrast favorably as regards their different modes of attachment. The former is club-shaped at its free extremity, and has a small root; the latter has a very narrow, expanded root, and square shape. These varieties are both of them represented in the other dry specimens. See preps. 1152, 1152^{15, 16}, and 1152⁶⁴; 1160⁹².

The region of the femur at the root of the trochanter minor appears in two specimens to have been affected by those influences which contribute to the development of these outgrowths. Can this be attributed in any way to the attachment of the tendons of the psoas and iliacus muscles? The preps. 1368 and 1152⁵ of the upper quarter of two left femurs display exostoses growing from the bone and eclipsing every trace of the trochanter minor. The last is the finest specimen. I found it in the dissecting room some years since. It

was taken from a young male subject of rather feeble development. It has a broad root, and the body of it rises forwards for the length of four inches and a half. The anterior surface is grooved where the psoas and iliacus muscles lay in contact with it. The posterior surface is convex. At about midway between its base and apex there was a false joint, as if at some time it had been broken. Its apex curved under Poupart's ligament, above which it was perceptible through the abdominal walls. Cancellous texture composes the principal mass even on its surface.

But the largest specimen of the coral-like, pedunculated exostosis forms one of our illustrations, Plate II, fig. 5. It is as fine an example as it is possible to meet with, and presents a curious feature in the existence of a foramen, marked *f* in the drawing. This is produced by the outermost growth grasping the shaft of the femur and becoming implanted on its surface. I suppose the continued action of the vastus muscle must, by the pressure made upon the growth during its development, have led to the curious result described. A full description of this specimen is given with the plates. A similar mode of implantation may be seen in prep. 1151⁵⁰.

By the side of the last is another femur, fig. 6, which, at first sight, appears to have a similar coral-like growth upon it. This, however, is the osseous base or skeleton of a growth, associated, in all probability, with cancer. If we compare this prep. 1167 with another, 1160⁹¹, it cannot be doubted but that the above interpretation is the correct one. In the illustration a large quantity of the bony growth has been broken off at *a*, but the elongated, crest-like, osteophytic processes descending along the bone at *b* are very characteristic of osseous growth in the vicinity of bone cancers. This specimen is from a burial-ground, and therefore without a history.

A curious specimen of lamellar exostosis is seen in prep. 1151⁷⁵, a portion of a right femur, and in 1151⁷⁶, an entire bone. Both occupy about the central one-fourth, and are on the outer side. Both the exostoses have broad basal attachments posteriorly, and free, crested edges in front, with a terminal point directed downwards. A vertical section of the first one has been made which shows that the compact structure is considerably thicker than usual.

The specimen 1151⁷⁸ has a similar shaped exostosis on the inner side of its central third, which terminates below in a very sharp point quite free from the shaft for two inches.

When exostoses grow to a very large size they sometimes undergo the process of necrosis. A case of this kind occurred in the hospital many years ago in a man of middle age, who for years had had a tumour at the inferior extremity of the femur. The integuments had ulcerated from mere pressure, the femoral artery was implicated in the growth, and amputation seemed to afford the only chance of removing the local inconvenience. To this treatment he would not consent. The patient was under the care of Mr. Hilton, who, perhaps, some day may be persuaded to publish more complete details of the case.

Fracture of an exostosis from the bone upon which it grows is a circumstance of such rare occurrence that I am induced to cite a case recorded by M. Gosselin.¹ A man, æt. 51, had had a tumour on the left femur from boyhood, which was an exostosis. It had been broken off by a blow inflicted with a rough piece of stone, which, at the same time, made a small wound from which there was a considerable effusion of blood. The man died, and it was then found that an exostosis had existed on the inner surface of the lower third of the femur. On its external surface the exostosis was knobby and adherent to the vastus internus and adductor tertius. It was implanted on the femur by two points; the one inferior, larger, the other superior, and more narrow, and between these two points there was a space in which the femur was not adherent to the tumour. In this manner an arch was formed, a condition quite isolated and exceptional. The bony growth was crushed into several fragments, many of which were completely detached.

The reader will see by comparing the above description with the preparation of the femur, the subject of our illustration, Plate II, fig. 5, how closely the two diseases must have resembled each other in their chief features, the difference being only that one was growing on the outside of the femur and the other on its inside.

M. Chassaignac, in the same 'Bulletin,' page 417, relates an instance of the fracture of a femur and of the pedicle of an

¹ 'Bull. de la Soc. de Chir. de Paris,' t. vii, p. 414, 1857.

exostosis, which had existed for many years in the immediate vicinity of the seat of injury.

But one of the most remarkable cases in relation with a femoral exostosis is that related by Dr. Boling.¹ A male, æt. 16, had been suffering five or six months when Dr. Boling amputated the limb on account of an immense swelling occupying the leg and thigh. Its diagnosis was obscure, although some of the characters of aneurism were present. The patient recovered. The examination of the popliteal space showed that a conical point of bone projected backwards from between the condyles of the femur. It was about half an inch in length, and by it both the popliteal artery and vein were perforated.

Four cases of exostosis on the tibia have been operated upon; three were males, one female. All were under twenty years of age when the growth was observed. The usual place in which these growths form is immediately below the internal tuberosity. I have seen a case in which symmetrical development of an exostosis occurred in this part in an adult, and the commencement of it was accompanied by pain.

In the museum is a very fine specimen of a styloid exostosis, having a very sharp end, extending downwards from the posterior ridge of a left tibia. Its extreme length is two and a half inches. Slightly curved, it is directed outwards and backwards, the apex being five eighths of an inch from the shaft. The preparation 1215²⁵ was found in a male, aged forty-nine years. P. M. 1866, No. 363.

A very curious specimen, 1251, is a right tibia and fibula united together firmly by bone (synostosis) at their inferior extremities. There are stalactitic projections of bone from the head of the tibia behind, and a small exostosis from the neck of the fibula pressing against the head of the tibia. At the inferior extremity of the tibia posteriorly there is a pedunculated, knobby, spongy exostosis with grooves on its surface as for the lodgment of tendons.

Professor R. Virchow gives a beautiful illustration of these multiple exostoses developed on the cylindrical bones of the lower extremity of a male, ten years old.²

¹ 'North American Med.-Chir. Rev.,' 1857, p. 608.

² 'Die krankhaften Geschwülste,' Bd. II, s. 84, Berlin, 1864-5.

From a tarsal and metatarsal bone exostoses have been excised, but we may pass on to the description of a noteworthy case of an osseous and cartilaginous growth which covered nearly the entire dorsal and plantar regions of the foot.

The case is reported by Mr. Thomas Falcon, formerly residing at Bradford, York, nearly in the following words.

A man, æt. 32, by trade a weaver, of a leucophlegmatic temperament, said that the above exostosis first made its appearance about fifteen years ago, and had gradually increased to its present enormous size. The tumour completely envelops the whole of the foot, both on its dorsal and plantar surface, its circumference being about eighteen inches. That portion of the tumour situate at the internal border of the foot is slightly moveable on its base, and apparently cartilaginous or gelatinous in texture, but in the middle and outer part of the foot it is immovable and osseous. There are two ulcerations on its dorsal aspect, from which spiculæ of bone have been extracted. The patient has never experienced pain, nor had any constitutional symptom indicative of the tumour being of a malignant nature. He had previously consulted three surgeons, who declined to remove the tumour, and said that amputation must be had recourse to. The patient objected to lose his leg, but was willing to submit to the removal of the tumour. From his history of the case I was led to infer that the growth of the tumour first commenced either from the cuboid or external cuneiform bones, or from the heads of the three outer metatarsal bones.

I gave it as my opinion that the tumour was attached by bone (and inseparable) only at the outer part of the foot, and that there would be a portion of the foot remaining, after the operation, sufficient for the support of the body and progressive motion. Having obtained the man's consent, I first removed the tumour in the manner hereafter described, and then a portion of the foot by the method described by Mr. Watton before the Medical Association at Dublin.¹

A description of the method of performing the operation here follows, which it is unnecessary to quote. Suffice it to add that the man recovered, and with a very useful member. Mr. Falcon informs me in a letter dated January, 1869, from Ful-

¹ 'The Lond. Med. Gaz.,' 1838, vol. xxi, p. 178.

neck, Leeds, that he subsequently removed a large mulberry calculus by lithotomy from this patient, from which operation he recovered.

Amputation of the four outer metatarsal bones and supporting tarsal bones was successfully performed by Mr. Key on account of injury.¹

The phalangeal exostosis of the great toe.—Thirteen operations for the removal of these growths have been performed; six on males, seven on females. In twelve instances the patient was between the ages of twelve and twenty-two; the thirteenth was thirty-nine years old. Within the last few weeks I have had a boy under treatment for this complaint, between eight and nine years old. It had been observed two years.

Sir Astley Cooper was the first writer to notice these growths on the ungual phalanx of the great toe. In 1818 he wrote: "Two instances of exostosis under the nail of the great toe, projecting considerably beyond it, have occurred in my practice; one of which occasioned so much pain and inconvenience to the lady who was the subject of it, that I was under the necessity of removing it; which I easily accomplished with a saw."²

Mr. Liston published a short paper on the disease in 1826, which, he writes, "so far as I know, has not been adverted to in any surgical work."³ It is illustrated with a plate, and the preparations from which the engravings were made are now in the museum at the Royal College of Surgeons, in London.

M. Dupuytren describes these growths and their appropriate treatment in a clinical lecture, carefully separating them from the cases of "in-growing toenail," as it is commonly termed.⁴

The drawings 24^{85, 91} and others show the ordinary appearance made by these growths. Springing from the ungual phalanx of the great toe, they push before them the overlying tissues, and produce irritation, by which these become thickened.

I have attempted in Plate II, fig. 3, to explain by means of a diagrammatic sketch the relation of such a growth to the neigh-

¹ 'Guy's Hosp. Reports,' vol. i, p. 265, 1836.

² 'Surgical Essays,' part i, p. 178.

³ 'Edin. Med. and Surgical Journ.,' vol. xxvi, p. 27.

⁴ 'Lec. Orales de Clin. Chir.,' t. 3, p. 412, edit. 1833.

bouring parts. The letter *a* points to a section of the phalanx; *b*, to the growth; *c*, to the tissue between it and the nail, which is sometimes fibro-cartilaginous. The line *d, d* indicates the course the incision should follow in order to excise it effectually.

It is unnecessary to give details of such cases as these at length. For their radical treatment and cure it is only necessary to excise the growth at its root. The amputation of the whole or part of the affected toe cannot be justifiable unless on account of some special reason. I know that authors recommend this treatment. Mr. Liston did. But experience derived from the observation of many cases enables me to state that excision of the growth alone suffices to cure the complaint. It may be very conveniently accomplished with a gouge, which should be inserted a little to the outside of the furrow which usually circumscribes the growth, and should be made to penetrate to the bone. The severance of the exostosis from the phalanx is then quickly and easily effected.

On the ungual phalanx of the little toe an exostosis is sometimes developed (see prep. 1287).

DESCRIPTION OF THE ILLUSTRATIONS.

PLATE I.

Copy of a drawing by Canton in the museum, Numbers 51, 52, representing a tumour of fifteen years' growth in the cervical region of a patient aged forty-eight years, removed by Mr. John Morgan in 1828. Cast 210, preps. 1541⁶⁰, 61, 72.

For a full history of the case see pp. 477 *et seq.*

PLATE II.

Fig. 1, drawing 6⁵⁰.—A growth of about eleven years' development removed by Mr. Birkett from the dorsal aspect of the left carpus of a lady aged twenty-two years. It was said to have commenced as a ganglion over the extensor carpi radialis.

Natural size.

A section of the growth is here delineated. *a*, nodules of cartilage; *b*, bone. These separate nodules were united together by dense fibre-tissue, of which tissue, indeed, there was one nodule entirely composed. To the touch, before the operation, this nodule felt like a very tense bursa, but it was quite solid, and without any trace of a central cavity.

Fig. 2, prep. 1152⁵⁰, drawing 15⁶³.—An exostosis removed from the inside of the femur by Mr. Poland, which had been growing between five and six years.

Natural size.

A. The outside of the growth.

a. The hard bony pedicle, from which (*b*) the periosteum has been reflected.

c. The cartilage.

B. A vertical section of the same growth.

*a*¹. Well-formed cancellous bone, with little marrow, having a thin layer of compact bone outside.

*a*². Very fine, loose cancelli, with much marrow.

b. Periosteum continuous with perichondrium.

c. Cartilage terminating abruptly.

d. Line of ossification between bone and cartilage.

Fig. 3. A diagrammatic sketch of a section of the second or ungual phalanx of a great toe, with an exostosis springing from its extremity and pushing up the toenail and sub-ungual tissues.

- a.* Section of phalanx.
- b.* The exostosis with an outer covering, *c*, of fibro-cartilage and the ordinary structures of the part.
- d, d.* The line in which the incision should be carried in order to cut off the exostosis completely from the phalanx.

Fig. 4. Copy of drawing, 4^{56t}, represents a section of the left horizontal ramus of a lower jaw, upon which a tumour described as "epulis" was growing. Natural size.

- a.* The new growth.
- b.* The continuity, by cancellous bone, of the jaw and the nucleus of the growth.

Fig. 5. Representation of prep. 1167⁵⁰, reduced. A left femur with multiple exostoses growing from the posterior surface of the lower part of the bone. There are two independent growths. One (*a*) has a contracted root (*b*) springing from the external linea aspera, and extending backwards and inwards it terminates in a coral-like head or crest, *a*. From the same root (*b*) a process ascends vertically to terminate in a sharp point, *c*.

Springing from the outside of the bone is a much larger mass (*d*), the root of which (*e*) extends from an oval-shaped foramen (*f*) to the outline of the femur. The growth passes round the outside of the bone and appears either to have joined with its anterior surface, or to have coalesced with another growth in the front. By this arrangement a foramen, or arch, is formed between the original shaft of the bone and the root of the new growth. It is a specimen from a burial ground, and was presented, in 1826, by Mr. William Jackson, of West Bromwich.

Fig. 6. A right femur, prep. 1167, which has, at its superior extremity, the osseous foundation of, probably, a cancerous growth. The upper division, *a*, has been much broken, or the growth decayed. The specimen is, doubtless, from a burial ground. The lower division, *b*, spreads over the posterior and

lateral surfaces of the bone, forming crests or ridges, the peculiar arrangement of which, in linear processes of extreme delicacy, osteophyte, is characteristic of its association with another morbid growth, and not simply bone. The student will, at once, see the resemblance between the outgrowths of bone in this specimen and one in which it is certain cancer existed with a like growth, if he carefully examines prep. 1160⁹¹.

PLATE III.

Fig. 1.—An os innominatum having exostoses developed on the horizontal ramus of the pubes and its descending ramus, with osseous ramifications crossing the thyroid foramen. Prep. 1134⁶⁸.

a, ilium; *b*, ischium; *c*, symphysis pubis; *d*, the exostosis. (See p. 500.)

Fig. 2.—Part of an ilium, upon which a large bony and cartilaginous growth was developed. This is a posterior view of the bony fabric of the tumour. Prep. 1132⁵².

a, dorsum ilii; *b*, acetabulum; *c*, bony growth, which extends through the substance of the original bone; *d*, a coral-like bony growth on the crista ilii. (See p. 488.)

PLATE IV.

Fig. 1 represents the section of a skull (prep. 1074⁸⁰) found in a churchyard. It is that of an adult, probably a male, and has numerous large and extensive exostoses on the external surface of the os occipitis. There are two smaller exostoses, one on the os frontis and the other at the union of the right parietal and frontal bones. (See p. 491.)

a. Very dense compact bone.

b. Cancellous structure continuous with the diploe above.

The exostosis is an outgrowth from the external table of the occipital bone. Compare Plates II and III, fig. 1, 'Trans. of Path. Soc.,' vol. iii.

Fig. 2. An exostosis behind the foramen magnum (prep. 1074^{ss}). (See p. 491.)

- a. The body of the bony growth.
- b. That which appears to have been an articular surface in contact with the spinous process of the second cervical vertebra.

Fig. 3 represents the prep. 1074. The interior of the calvaria is seen covered with large tuberous bony growths, especially the frontal bone. (See p. 493.)

At *a* the section shows the increased thickness of the inner table.

Since this drawing was made the section of the bone has been rubbed smooth. Its structure is consequently more defined, and it is very curious.

Plate I.



6

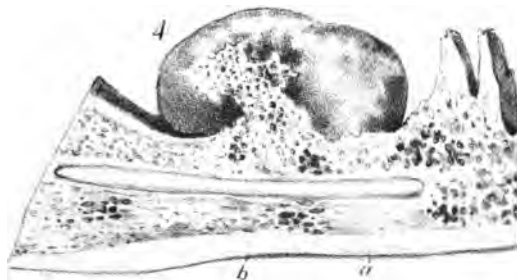
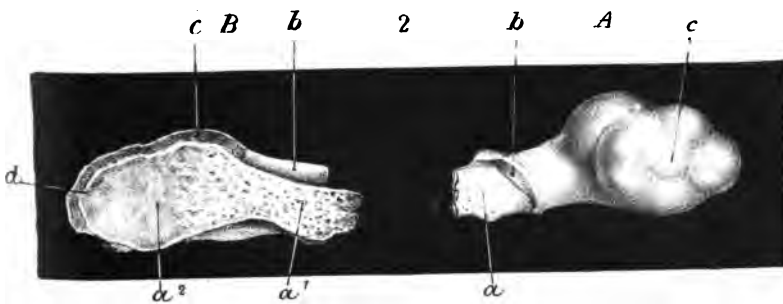
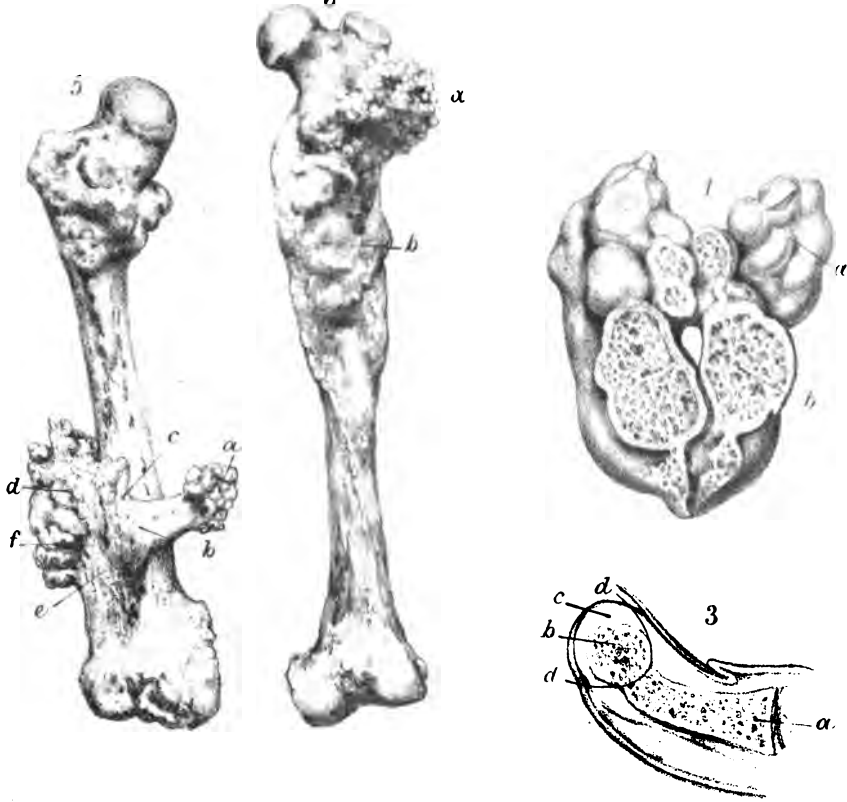


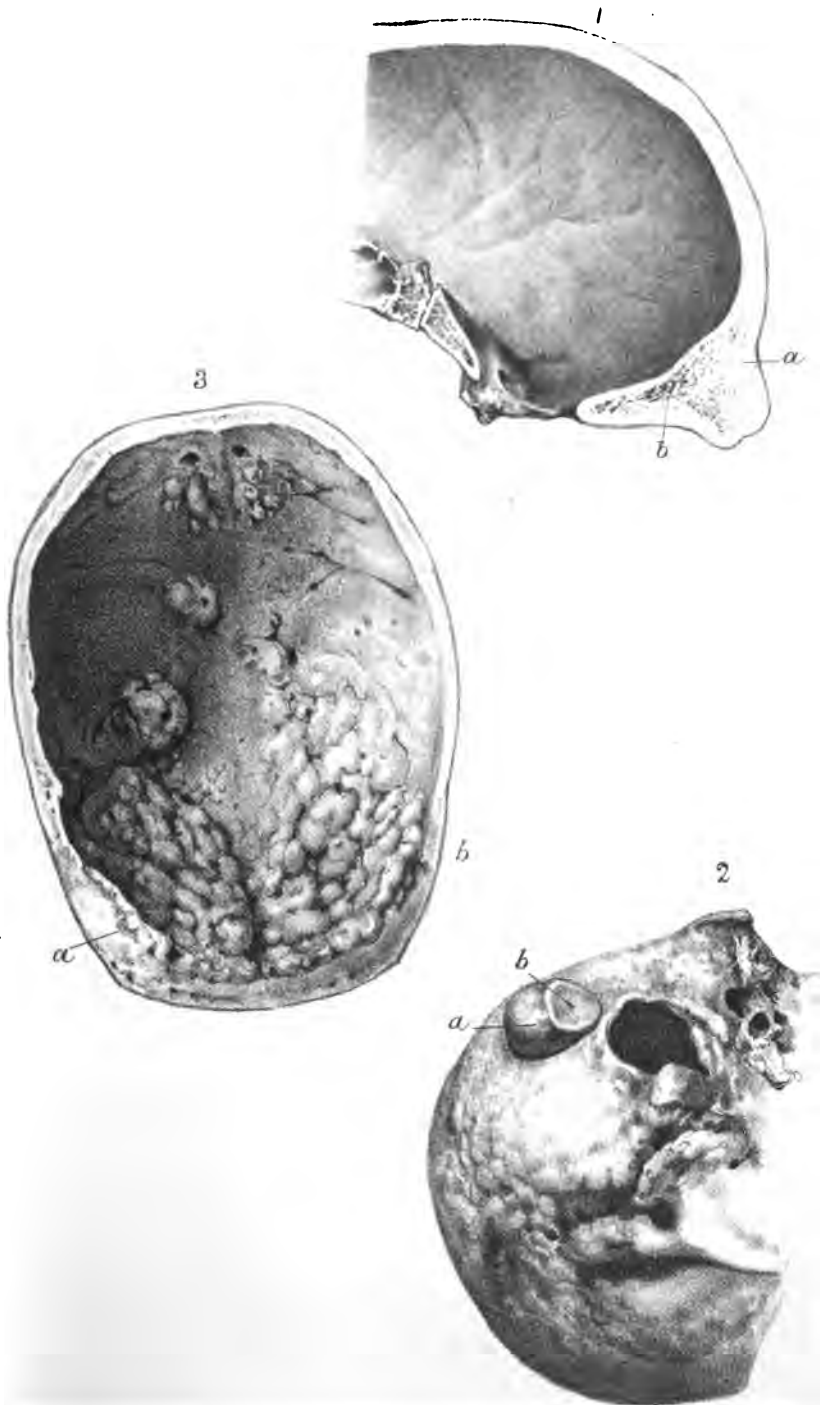
Plate III.



W. H. Hurst, lith.

M. & N. Hanhart, imp.

Plate IV



L I S T
OF
GENTLEMEN EDUCATED AT GUY'S HOSPITAL,
WHO HAVE PASSED THE
EXAMINATIONS OF THE SEVERAL UNIVERSITIES, COLLEGES,
&c. &c.

University of Cambridge.

Examination for the degree of Master in Surgery.

J. N. C. Davies-Colley, M.A. | J. P. Hartree, B.A.

Final examination for the degree of Bachelor in Medicine.

J. N. C. Davies-Colley, M.A.

Second examination for the degree of Bachelor in Medicine.

W. T. P. Douglas, B.A. | Hubert Airy, M.A.

T. K. Clarke, M.A.

First examination for the degree of Bachelor in Medicine.

Frank C. Turner, B.A.

University of London.

Examination for the degree of Master in Surgery.

*Henry Greenway Howse.

Second examination for the degree of Bachelor of Medicine.

First Class.

†Reginald Eager.

John Makens.

Henry Charles Hilliard.

‡Frederick Taylor.

First examination for the degree of Bachelor of Medicine.

First Division.

Alfred Ashby.

R. C. Lucas.

§Frederick Durham.

||H. E. Walker.

Second Division.

John De Liefde.

Robert Harris.

* Worthy of Medal.

† Gold Medal, and worthy of Scholarship in Forensic Medicine. Third, and worthy of Scholarship in Midwifery. First Class Honours in Medicine.

‡ Scholarship and Gold Medal in Midwifery. Scholarship and Gold Medal in Forensic Medicine. Third, and worthy of Scholarship in Medicine.

§ Honours in Anatomy.

|| Honours in Anatomy.

514 Gentlemen admitted to Degrees, &c., in the year 1868.

*First examination for the degree of Bachelor of Medicine,
excluding Physiology.*

First Division.

W. F. R. Burgess.

Second Division.

W. A. Smith. | J. Taylor.

Physiology only.

First Division.

J. R. Stocker.

Preliminary Scientific M.B. Examination.

First Division.

A. R. Betts. | *F. J. Carey, M.A.
Arthur Buchanan. | B. N. Dalton.

Second Division.

Charles Allwork. | A. M. Branfoot.
D. B. Murdoch.

First examination for the degree of Bachelor of Science.

Second Division.

D. B. Murdoch.

Royal College of Physicians.

Examination for Membership.

July, 1868.

John Jones Phillips, M.D.

October, 1868.

J. Sherwood Stocker, M.D. | J. Thompson Dickson, M.B.

Examination for the Licentiate'ship.

January, 1868.

S. W. Bushell, M.D.

February.

C. W. Chapman. | W. C. Toulmin.

July.

George Andrews. | W. R. Cortis. | J. F. Goodhart.
R. M. Cole. | Branford Edwards. |

October.

Charles Higgins. | J. W. Barry.

December, 1868.

W. B. Giles. | W. Bevan Lewis. | J. Ashburton Thomp-
Walter Greene. | R. C. Lucas. | son.

* Exhibition in Botany. Exhibition in Zoology.

Royal College of Surgeons of England.

Final examination for the Fellowship.

May, 1868.

M. A. Adams.	|	H. G. Howse, M.S.
--------------	--	-------------------

November, 1868.

J. O. Brookhouse, M.D.	|	E. H. Galton.
Richard Davy, M.D.	|	F. W. Humphreys.
George Eastes, M.B.	|	R. N. Ingle, M.D.

First examination for the Fellowship.

May, 1868.

M. A. Adams.	|	H. G. Howse, M.S.	|	C. J. Oldham
R. Davy, M.D.	|	F. W. Humphreys.	|	P. T. Scott.
Frederick Durham.	|	R. N. Ingle, M.D.	|	J. Taylor.
Joshua Duke.	|	J. De Liefde.	|	H. E. Walker.
E. H. Galton.	|	R. C. Lucas.	|	J. G. Wiseman.

November, 1868.

J. O. Brookhouse, M.D.	|	George Eastes, M.B.
------------------------	--	---------------------

Final Examination for the Membership.

January, 1868.

R. C. Lucas.	|	Henry Lyne.	|	J. N. C. Davies.
R. T. Hilder.	|	George Andrews.	|	Colley, M.A., M.C.

April.

George Bradley.	|	A. J. Sharpe.	|	G. E. W. Turner.
J. H. Ross.	|	R. G. Coombe.	|	Frederick Taylor, M.B.
Charles Higgins.	|	C. J. Sells.	|	Richard Rendle.
W. H. Nicholls.	|	Edwin Duke.	|	F. J. Naish.
E. E. Cass.	|	J. H. Morton.	|	W. C. Faraker.
W. R. Cortis.	|	R. L. Wilson.	|	J. F. Chittenden.

May.

J. H. Gay.	|	J. R. Morgan.	|	W. P. Bridges.
J. E. Ward.	|	J. A. Thompson.	|	C. T. Brookhouse.
J. H. Forte.	|	Jacob French.	|	G. R. Nunn.
W. J. Mason.	|	T. C. H. Spencer.	|	Henry Gould.
R. E. Grigson.	|		|	

July.

P. T. Scott.	|	G. S. Boulton.	|	J. P. Doughty.
A. W. G. Atkins.	|	C. A. Nason.	|	George Mason.
D. G. Rowlands.	|	Joshua Duke.	|	J. D. Mason.
J. T. Gittens.	|	Francis Letts.	|	Branford Edwards.
Edward Colson.	|	Richard Banks.	|	C. E. Wing.
Thomas Brockwell.	|		|	

November.

A. H. Baines.	|	John Carr.	|	J. F. Goodhart.
J. T. Jones.	|	L. J. Moseley.	|	T. W. Evans.
W. B. Lewis.	|	R. M. Cole.	|	Samuel Jackson.
George Vawdrey.	|		|	

516 *Gentlemen admitted to Practice in the year 1868.*

First examination for the Membership.

January, 1868.

G. S. Boulton.
J. R. Joseph.

E. B. B. Robertson.
H. G. Turner.

April.

C. E. S. Perkins.
J. W. Lacey.
R. H. Pritchard.
H. G. Peacock.
W. F. Lill.
W. P. Yates.
C. E. Aiken, B.A.
H. D. Palmer.
Edward Bovill.
O. S. Shaw.
Wright Nicholson.
W. E. Crowther.
Wilson Eager.
R. H. Leigh.
A. C. Roberts.
L. P. Grover.
George Abbott.
Samuel Walker.

T. J. Dixon.
R. F. Grant.
John Morris.
E. B. Evans.
Alfred Moor.
A. W. Smith.
H. G. Button.
H. W. Collins.
John Reynolds.
H. E. Dixon.
H. E. Hudson.
J. H. Ross.
William Garratt.
E. J. Hart.
John Jolliffe.
Walter Waller.
J. E. B. Burroughs.
T. S. Townshend.

W. A. Marsh.
Walter Buchanan.
W. C. S. Clapham.
H. Adcock.
E. W. Way.
N. A. R. Harrison.
William Paulson.
G. P. Applin.
William Beatson.
William Jones.
G. K. Elphinstone.
A. D. Wray.
C. H. W. Parkinson.
John Maffey.
Francis Coomber.
W. F. R. Burgess.
R. J. Pye Smith.

July.

Richard Wood.
M. T. Kavanagh.
A. R. Manby.

George Barraclough.
S. F. Murphy.
William Greaves.

T. G. Lidbetter.
J. W. Phillips.
Jas. Bunting.

Apothecaries' Society.

Gold medal in Botany.

F. J. Carey, M.A.

Final examination for the Licenciateship.

February, 1868.

R. M. Cole.

Henry Gould.

March.

William Cortis.

J. H. Ross.

April.

J. T. Jones.
F. J. Naish.

J. B. Stocker.
John Carr.

May.

George Vawdrey.

J. A. Sharpe.

June.

Richard Rendle.

July.

George Andrews.

John Chapman.

Herbert Chabot.

Gentlemen admitted to Practice in the year 1868. 517

August.		
Richard Stephens.	|	G. R. Raine, M.B.
W. P. Bridges.	|	Frederick Robertson.
September.		
C. T. Brookhouse.	|	Benjamin Duke.
H. G. Shorter.	|	G. R. Nunn.
J. A. Thompson.		
October.		
Charles Higgens.		
November.		
Edward Colson.	|	Joshua Duke.
A. R. Ticehurst.		
December.		
Edward Elphick.	|	R. B. Hogg.
A. R. S. Perkins.		

First Examination for the Licentiate'ship.

January, 1868.		
A. R. Ticehurst.	|	Richard Banks.
Frederick Robertson.	|	J. D. Mason.
February.		
G. R. Nunn.	|	A. H. Laxton.
Richard Stephens.		
March.		
Herbert Chabot.	|	John Taylor.
W. L'H. Blenkarne.		
April.		
W. D. Lovell.		
May.		
George Abbott.	|	A. H. Collet, B.A.
July.		
W. F. Lill.	|	W. E. Crowther.
John Morris.	|	John Phillips.
John Jolliffe.	|	A. C. Roberts.
J. D. Roberts.		
August.		
F. D. Atkins.	|	W. A. Marsh.
W. H. Lloyd.	|	E. J. Hart.
T. W. Lacey.	|	C. H. W. Parkinson.
Wilson Eager.	|	
September.		
W. B. Taylor.		
October.		
W. P. Yates.	|	J. P. Grover.
Alfred Gillingham.	|	J. E. B. Burroughs.
November.		
E. L. Collins.	|	R. H. Pritchard.
F. M. Wallis.		

GUY'S HOSPITAL MEDALLISTS AND PRIZEMEN, 1867-8.**EXAMINATION OF STUDENTS IN MEDICINE AND ITS
ALLIED SCIENCES, AUGUST 3rd, 1868.***Third Year's Students.*

Edward Forbes Gaitskell, Erith, Kent, the Treasurer's Gold Medal for Medicine.

Augustus Hewitt Aldridge, Shirley House, Dorchester, the Treasurer's Gold Medal for Surgery.

William Prior Mallam, Kidlington, Oxon, } Equal Prizes,
Edward Elphick, Burra Burra, South Australia, } £37 10s.

Augustus Hewitt Aldridge, Shirley House, Dorchester, Honorary Certificate.

Charles Dudley Maynard, Hornsea, Honorary Certificate.

Second Year's Students.

Rutherford John Pye-Smith, Hackney, first Prize, £35.

George Abbott, Nottingham, second Prize, £30.

John Jolliffe, Hammersmith, Honorary Certificate.

Henry Edward Dixon, Watlington, Oxford, Honorary Certificate.

First Year's Students.

H. E. Southee, Canterbury, first Prize, £30.

G. Deeping, Castle Terrace, Newark, second Prize, £25.

E. G. Russell, Ashburton, Devon, third Prize, £10 10s.

H. Bailey, Kingston House, Edmonsbury, Honorary Certificate.

A. K. Newman, Lee, Kent, Honorary Certificate.

ENTRANCE EXAMINATION IN CLASSICS, MATHEMATICS, &c.

October, 1868.

George Thomas Bettany, Penzance, first Prize, £25.

Thomas Eastes, Folkestone, second Prize, £20.

Robert Harry Hughes, Putney, third Prize, £15.

Henry Seymour Branfoot, Brentwood, Honorary Certificate.

PUPILS' PHYSICAL SOCIETY.

The following Prizes were awarded at the end of the Session 1867-8.

To Mr. C. D. Maynard, for his Essay on "Vomiting."

To Mr. J. A. Thompson, for his Paper on "The Economization of Tissue in Typhus," read before the Society.

APPOINTMENTS MADE IN AND SINCE NOVEMBER, 1867.**HOUSE-SURGEONS.**

H. Morris, B. A., M.B.	J. Davies-Colley, M.C.,	G. Rootes.
G. R. Raine, M.B.	M. A.	C. J. Sella.
A. B. Elliott.	B. N. Dalton.	R. Rendle.

RESIDENT HOUSE-PHYSICIAN.

(July to January.)

J. Reginald Stocker.

RESIDENT OBSTETRIC CLERKS.

O. H. Foster, M.A., M.B.	Frederick Taylor, M.B.	R. M. Cole.
Charles J. Sells.	F. S. Daldy.	J. F. Goodhart.
Walter Greene.	Richard Rendle.	W. R. Cortis.
J. B. Saundry.	J. A. Sharpe.	Branford Edwards.

SURGEONS' DRESSERS.

G. Vawdrey.	A. H. Baines.	W. D. Lovell.
J. F. Goodhart.	J. P. Hartree, M.C., M.B.	R. B. Hogg.
George Andrews.	Joshua Duke.	R. G. Coombe.
T. C. H. Spencer.	Edward Colson.	E. F. Gaitskell.
P. T. Scott.	Henry Gould.	W. F. Flowers, B.A.
T. J. Gittens.	H. G. Turner.	A. H. Aldridge.
W. R. Cortis.	J. R. Ticehurst.	W. P. Mallam.
J. Rigby-Hughes.	J. de Liefde.	Robert Harris.

CLINICAL CLERKS.

Winter Session, 1867-8.

Frederick Taylor, M.B.	Reginald Stocker.	Henry Gould.
J. P. Hartree, M.C., B.A.	J. A. Bevan.	

Summer Session, 1868.

G. R. Nunn.	W. F. Flowers, B.A.	C. E. Wing.
Richard Banks.	Richard Stephens.	Richard Rendle.

Winter Session, 1868-9.

A. H. Baines.	George Andrews.	Edward Colson.
Chas. Higgins.	Frederick Robertson.	C. D. Maynard.

DRESSERS IN THE EYE WARDS.

Burford Norman.	J. A. Sharpe.	Charles Higgins.
A. R. S. Perkins.	R. M. Cole.	Edward Elphick.
Charles J. Sells.	J. F. Goodhart.	Frederick Taylor, M.B.
Branford Edwards.	J. B. Saundry.	R. C. Lucas.

POST-MORTEM CLERKS.

Lewis Edwardes.	H. W. Collins.	A. D. Wray.
H. B. Taylor.	W. E. Saunders.	John Jolliffe.
John Tuck.	A. R. Ticehurst.	C. H. W. Parkinson.
Richard Stephens.	Reginald Taylor.	T. S. Townshend.
R. B. Hogg.	F. S. Tuck.	W. A. E. Waller.
S. Stickland.	Wilson Eager.	E. Aiken, B.A.
A. H. Aldridge.	E. B. Robertson.	J. W. Lacey.
W. B. Fasken.	W. P. Mallam.	George Abbott.
R. L. Wilson.		

ASSISTANT SURGEON'S DRESSERS, AND DRESSERS IN THE SURGERY.

B. Norman.	A. H. Aldridge.	W. P. Mallam.
C. J. Sells.	W. B. Taylor.	Edward Elphick.
Richard Stephens.	T. W. Hubbard.	J. T. Jones.
E. H. Steele.	Richard Banks.	George Abbott.
E. L. Collins.	Edwin Duke.	Reginald Taylor.
J. O. O'Brien.	R. G. Coombe.	A. C. Newman.
W. F. Flowers, B.A.	W. R. Cortis.	W. P. Bridges.
G. E. W. Turner.	A. R. Ticehurst.	A. E. Kynaston.
Edward Colson.	F. D. Atkins.	R. P. Grigson.
J. F. Chittenden.	John Redmayne.	C. D. Maynard.
Lewis Edwardes.	J. D. Roberts.	W. A. D. Fasken.
P. T. Scott.	E. F. Gaitskell.	T. S. Townshend.
W. D. Lovell.	F. Robertson:	T. W. Evans.
F. S. Tuck.	A. A. Thomas.	W. H. Lloyd.
J. Phillips.	Hubert Airy, M.A.,	R. B. Hogg.
A. E. B. Love.	M.B.	S. F. Murphy.
J. E. Ward.	E. E. Cass.	G. R. Nunn.
A. Ashby.		

DENTAL SURGEON'S DRESSERS.

A. H. Collet, B.A.	Edward Elphick.	J. T. Jones.
C. D. Maynard.	A. E. B. Love.	J. D. Roberts.
E. F. Gaitskell.	W. E. Saunders.	E. H. Steele.
W. L'H. Blenkarne.	A. H. Aldridge.	F. S. Tuck.
W. H. Nicholls.	W. P. Mallam.	

AURAL SURGEON'S DRESSERS.

A. H. Aldridge.	George Abbott.	Wilson Eager.
Richard Stephens.	W. L'H. Blenkarne.	E. J. Hart.
J. F. Chittenden.	A. Gillingham.	E. H. Steele.
F. S. Tuck.	A. R. Dunnage.	S. F. Murphy.
R. C. Lucas.	J. L. Shaw.	

MEDICAL WARD CLERKS.

W. F. Flowers, B.A.	J. H. Morton.	A. E. Kynaston.
J. Rigby-Hughes.	A. A. Thomas.	B. B. Conolly, B.A.
Edward Colson.	F. S. Tuck.	W. T. P. Douglas, B.A.
A. Gillingham.	A. M. Aldridge.	Francis Coomber.
R. Stephens.	T. W. Hubbard.	Alfred Ashby.
W. H. Lloyd.	P. Kingsford.	A. W. Smith.
J. H. Ross.	E. B. B. Robertson.	A. E. B. Love.
J. A. Thompson.	G. E. W. Turner.	William Dryland.
Thomas Chalmers.	R. G. Coombe.	W. E. Saunders.
C. J. Oldham.	C. T. Brookhouse.	E. Aiken, B.A.
Walter Greene.	J. T. Jones.	A. R. Dunnage.
L. F. Cogan.	Hubert Airy, M.A.,	T. W. Parker.
W. B. Taylor.	M.B.	William Paulson.
W. H. Nicholls.	J. T. Dixon.	T. S. Townshend.
George Barraclough.	W. L'H. Blenkarne.	James Bunting.
J. Phillips.	T. W. Lacey.	E. B. Evans.
W. A. D. Fasken.	T. W. Evans.	

SURGICAL WARD CLERKS.

J. H. Gay.	H. G. Peacock.	A. M. Roberts.
M. H. Laxton.	G. A. Coombe.	Benjamin Rix.
W. A. E. Waller.	W. T. P. Douglas, B.A.	Richard Galpin.
E. B. Evans.	A. M. Branfoot.	Samuel Hosegood.
T. H. B. Rodwell.	W. J. Heddy.	N. A. R. Harrison.
W. A. Nicoll.	B. B. Connolly, B.A.	F. H. Clarke.
H. E. Dixon.	J. T. Ingoldby.	W. E. Farnfield.
F. J. Carey, M.A.	Edward Bovill.	F. E. Barrow.
E. J. Hart.	Reginald Taylor.	H. J. W. Barrow.
W. E. Saunders.	B. P. Morison.	F. G. Larkin.
O. S. Shaw.	A. R. Manby.	G. H. Cable.
R. J. Pye-Smith.	W. P. Yates.	R. S. Armstrong.
Wilson Eager.	Michael Harris.	Alfred Matcham.
F. D. Grayson.	John Morris.	Francis Coomber.
William Williams.	W. F. Lill.	A. C. Newman.
William Dryland.	Benjamin Tubb.	William Nesbitt.
W. H. Roots.	A. C. Roberts.	W. C. Blaker.
James Bunting.	Walter Buchanan.	F. C. Batchelor.
W. H. Collins.	John Jolliffe.	
Samuel Walker.	G. K. Elphinstone.	

ASSISTANT-PHYSICIAN'S CLERKS.

A. A. Thomas.	J. Phillips.	J. T. Jones.
C. H. W. Parkinson.	J. H. Gay.	H. G. Button.
E. Elphick.	William Greaves.	William Paulson.
George Abbott.	W. H. Lloyd.	H. D. Palmer.
G. E. W. Turner.	R. G. Coombe.	E. W. Way.
A. R. Dunnage.	T. W. Hubbard.	E. B. Evans.
W. P. Mallam.	E. F. Gaitskell.	H. E. Dixon.
F. Robertson.	E. J. Hart.	R. H. Pritchard.
J. Tuck.	W. A. Nicoll.	J. B. Bunny.
R. B. Hogg.	J. H. Ewart.	A. E. B. Love.
Wm. Butler.		

GUY'S HOSPITAL.

1868-69.

THE MEDICAL SESSION

COMMENCED IN OCTOBER.

The INTRODUCTORY ADDRESS was given by

DR. MOXON,

On Thursday, the 1st of October, when the Prizes awarded during the past year were also distributed.

MEDICAL OFFICERS.

Physicians.—OWEN REES, M.D., F.R.S.; S. O. HABERSHON, M.D.; S. WILKS, M.D.

Assistant-Physicians.—F. W. PAVY, M.D., F.R.S.; W. MOXON, M.D.; HILTON FAGGE, M.D.

Surgeons.—EDWARD COCK, Esq.; JOHN HILTON, Esq., F.R.S.; JOHN BIRKETT, Esq.; ALFRED POLAND, Esq.

Assistant-Surgeons.—J. COOPER FORSTER, Esq.; T. BRYANT, Esq.; ARTHUR E. DURHAM, Esq.

Obstetric Physician.—HENRY OLDHAM, M.D.

Assistant Obstetric Physician.—J. BRAXTON HICKS, M.D., F.R.S.

Surgeon-Dentist.—J. SALTER, M.B., F.R.S.

Surgeon-Aurist.—J. HINTON, Esq.

Eye Infirmary.—A. POLAND, Esq.; C. BADEB, Esq.

Medical Registrar.—HILTON FAGGE, M.D.

Surgical Registrar.—J. N. DAVIES-COLLEY, M.C.

WINTER SESSION—LECTURES.

Medicine.—OWEN REES, M.D., F.R.S.; S. WILKS, M.D.

Surgery.—JOHN BIRKETT, Esq.; J. COOPER FORSTER, Esq.

Anatomy.—ARTHUR E. DURHAM, Esq.

Physiology.—F. W. PAVY, M.D., F.R.S.

Chemistry.—ALFRED TAYLOR, M.D., F.R.S.

Experimental Philosophy.—T. STEVENSON, M.D.; J. N. DAVIES-COLLEY, M.C.

Demonstrations on Cutaneous Diseases.—HILTON FAGGE, M.D.

Demonstrations on Anatomy.—J. BANKART, Esq.; P. H. PYE-SMITH, M.D.; JOHN J. PHILLIPS, M.D.; H. G. HOWSE, M.S.

Demonstrations on Morbid Anatomy.—WALTER MOXON, M.D.

Demonstrations with the Microscope.—H. G. HOWSE, M.S.

SUMMER SESSION—LECTURES.

Medical Jurisprudence.—ALFRED TAYLOR, M.D., F.R.S.
Materia Medica.—S. O. HABERSHON, M.D.
Midwifery.—J. BRAXTON HICKS, M.D., F.R.S.
Ophthalmic Surgery.—A. POLAND, Esq., and C. BADER, Esq.
Pathology.—WALTER MOXON, M.D.
Comparative Anatomy.—P. H. PYE-SMITH, M.D.
Use of the Microscope.—H. G. HOWSE, M.S.
Botany.—C. JOHNSON, Esq.
Demonstrations on Practical Chemistry.—T. STEVENSON, M.D.
Demonstrations on Manipulative and Operative Surgery.—T. BRYANT, Esq.

The Hospital contains 600 beds. Special Clinical Instruction is given by the Physicians in Wards set apart for the most interesting cases.

Clinical Lectures—Medicine, Surgery, and Midwifery—Weekly.
 Lying-in-Charity—Number of cases attended annually about 1600.
 Diseases of Women—26 beds. Ophthalmic cases—30 beds.
 Museum of Anatomy, Pathology, and Comparative Anatomy—Curator, W. MOXON, M.D.,—contains 10,000 specimens, 4000 drawings and diagrams, a unique collection of Anatomical Models, and a series of 400 Models of Skin Diseases.

Gentlemen desirous of becoming Students must give satisfactory testimony as to their education and conduct. Fee—£40 for the first year, £40 for the second, and £10 for every succeeding year of attendance; or £100 in one payment entitles a Student to a perpetual ticket.

Dressers, Clinical Clerks, Ward Clerks, Obstetric Residents, and Dressers in the Eye Wards, are selected from the Students according to merit. There are two Resident House-Surgeons, each of whom holds office for four months; two as Junior, and two as Senior. The Resident House-Physician is appointed for six months.

Six Scholarships, varying in value from £25 to £40 each, are awarded at the close of each Summer Session for general proficiency.

Two Gold Medals are given by the Treasurer—one for Medicine, and one for Surgery.

A Voluntary Examination takes place at Entrance, in Elementary Classics and Mathematics. The three first candidates receive respectively £25, £20, and £15.

Several of the Lecturers have Vacancies for Resident Private Pupils.

For further information, apply to Mr. STOCKER.

GUY'S HOSPITAL;
 January, 1869.

ASTLEY COOPER PRIZE.

**The Tenth Triennial Prize of Three Hundred Pounds,
Under the Will of the late SIR ASTLEY P. COOPER, Bart.,**

WILL BE AWARDED TO

THE AUTHOR OF THE BEST ESSAY OR TREATISE

ON THE ANATOMY AND PHYSIOLOGY OF
THE "LYMPHATIC SYSTEM."

The Adjudicators will consider that Essay to possess most merit which contains additional facts respecting the existence of Lymphatics in those tissues and organs hitherto thought to be devoid of them; or demonstrates the mode in which they originate, or communicate with the blood vessels; or explains the functions of the lymphatic vessels and glands in the animal body.

THE Condition annexed by the Testator is, "That the Essays or Treatises to be written for such Prize shall contain original experiments and observations, which shall not have been previously published, and that each Essay or Treatise shall (as far as the subject shall admit of) be illustrated by preparations and by drawings, which preparations and drawings shall be added to the Museum of Guy's Hospital, and shall, together with the Work itself and the sole and exclusive interest therein and the copyright thereof, become henceforth the property of that Institution, and shall be relinquished and transferred as such by the successful candidate."

And it is expressly declared in the Will "that no Physician, or Surgeon, or other officer for the time being, of Guy's Hospital or of St. Thomas's Hospital, in the Borough of Southwark, nor any person related by blood or by affinity to any such Physician, or Surgeon, for the time being, or to any other officer for the time being in either of the said Hospitals, shall at any time receive or be entitled to claim the Prize." But, with the exception here referred to, this Prize is open for competition to the whole world.

Candidates are informed that their Essays, either written in the English language, or, if in a Foreign Language, accompanied by an English translation, must be sent to Guy's Hospital on or before January 1st, 1871, addressed to the Physicians and Surgeons of Guy's Hospital.

Each Essay or Treatise must be distinguished by a Motto, and be accompanied by a sealed envelope containing the Name and Address of the Writer. None of the envelopes will be opened, except that which accompanies the successful Treatise. The unsuccessful Essays or Treatises, with the illustrative preparations and drawings, will remain at the Museum of Guy's Hospital until claimed by the respective writers or their agents.





